DRAFT ENVIRONMENTAL IMPACT STATEMENT

Badger State Solar Project
Jefferson County, Wisconsin

Prepared for:

U.S. Department of Agriculture
Rural Utilities Service (RUS)

Prepared By:
AECOM
Greenville, SC

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Please submit comments and written questions to:
United States Department of Agriculture
Attention: Peter Steinour
Rural Utilities Service, WEP/EES
1400 Independence Ave., SW
Washington, DC 20250

BadgerStateSolarEIS@usda.gov

EXECUTIVE SUMMARY

This Environmental Impact Statement (EIS) was prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended (42 United States Code [U.S.C.] *4321et seq.*), Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] part 1500), and Rural Utilities Service (RUS), Environmental Policies and Procedures (7 CFR part 1970). This EIS evaluates the potential direct, indirect, and cumulative environmental effects related to providing financial assistance for the Badger State Solar, LLC's (Badger State Solar) Alternating Current solar project (Project). The Project is located in the Townships of Jefferson and Oakland, in Jefferson County, Wisconsin. Badger State Solar has indicated that it will request financial assistance from the United States (US) Department of Agriculture (USDA) RUS for the Proposed Action, and information contained in this EIS serves as a basis for the decision regarding whether to provide the requested financial assistance.

Any final action by RUS related to the project proposal will be subject to, and contingent upon, compliance with all relevant executive orders and Federal, state, and local environmental laws and regulations in addition to the completion of the environmental review requirements as prescribed in RUS Environmental Policies and Procedures, 7 CFR part 1970.

Purpose and Need [EIS Section 1.2]

Badger State Solar has indicated that it will request Federal financing from the USDA RUS for development of the Project. While RUS is authorized under the Rural Electrification Act of 1936 (REA) to finance electric generation infrastructure in rural areas, it is the Midcontinent Independent System Operator, Inc. (MISO), not RUS, who is responsible for electric grid planning. Supporting renewable energy projects meets both RUS's goal to support infrastructure development in rural communities and USDA's support of the June 2013 Climate Action Plan, which encourages voluntary actions to increase energy independence.

Public Involvement [EIS Section 1.5]

The Notice of Intent (NOI) to prepare the Badger State Solar EIS and to hold a virtual public scoping meeting was published in the Federal Register on October 5, 2021 initiating the EIS review process. The NOI invited stakeholders to comment on the Proposed Action and assist in identifying the required permits and approvals that must be obtained and the administrative procedures that must be followed. The NOI also announced a virtual public scoping meeting held on October 26. The NOI is provided in the Scoping Report (Appendix A).

In addition to the NOI, a notice was published in the Daily Jefferson County Union and Watertown Daily Times newspapers published on October 6, 7, and 8, 2021. Copies of the tearsheets from these publications are provided in the Scoping Report (Appendix A).

The NOI and other project information (including the Alternative Evaluation and Site Selection Studies) was available for review on the RUS and Badger State Solar websites (https://www.rd.usda.gov/resources/environmental-studies/impact-statements, https://badgerstatesolar.consultation.ai, and https://www.badgerstatesolar.com) and also at the following locations (Jefferson Public Library in Jefferson, WI; the Cambridge Community Library in Cambridge, WI and the Lake Mills Library in Lake Mills, WI).

RUS hosted the virtual public scoping meeting on October 26. Two individuals attended this scoping meeting and had no comments during the meeting. The meeting transcript is provided in the Scoping Report (Appendix A). RUS also hosted an interagency meeting on October 28. Seven individuals from various state and Federal agencies and local governments attended the meeting and participated in the discussion. Comments received during the interagency meeting were focused on transportation topics (pertaining to access points/restrictions and permitting), wetlands and waterways, and the rusty patched bumblebee. The only written submittal received during the scoping period was a request from the US Army Corps of Engineers to be a consulting party on the Project. In addition to the public involvement process described above, Badger State Solar consulted with the Wisconsin Department of Natural Resources (WDNR) and an endangered resource review has been submitted to the agency. Badger State Solar also consulted with the Federal Aviation Administration (FAA), property owners, local town and county officials and staff, state elected representatives, and Wisconsin Department of Agriculture Trade and Consumer Protection. RUS has initiated consultation with the Wisconsin State Historic Preservation Officer (SHPO), Natural Resources Conservation Service (NRCS), and informal consultation with the US Fish and Wildlife Service (USFWS).

The Notice of Availability (NOA) for the Draft EIS was published in the Federal Register in March 2022 and in the local newspapers used for previous public notices. Copies of the Draft EIS also were available for review at the public libraries where scoping materials were provided. All substantive comments received on the Draft EIS will be considered in preparation of the Final EIS. The availability of the Final EIS will be announced in the Federal Register and the local newspapers used in previous public notices.

Project Proposal [EIS Sections 1.1.1 and 2.3]

Badger State Solar proposes to construct, install, operate, and maintain a 149-megawatt (MW) photovoltaic (PV) Alternating Current solar energy generating facility on a site in the Townships of Jefferson and Oakland, in Jefferson County, Wisconsin. The total estimated Project cost would be approximately $225,000,000. Project construction would begin in October 2022. Construction would be complete and the Project would be expected to come online by Fall 2023.

The Jefferson County site initially included three proposed development areas: The Primary Solar Array Area, Alternate Solar Array Area, and Optional Solar Array Area. As

the solar facility design progressed, Badger State Solar determined that the approximately 1,200-acre Primary Area would be suitable to host the proposed 149 MW solar power facility without requiring development of the Alternate and Optional Areas. The Primary Area became the Proposed Action which is the focus of this EIS. The Proposed Action would take place on approximately 1,200 acres located on the north and south sides of US Highway 18 (US 18), approximately 2 miles west of the City of Jefferson and west of State Highway 89. Site land cover is predominantly agricultural crops and pasture, with some forest and wetland.

Construction involves the installation on leased lands of 487,848 single-axis tracking PV panels. The PV panels would be mounted on a steel racking frame. Supporting facilities include an electrical substation. The lease agreement allows for an operating period of 40 years. A power purchase agreement has been executed with Dairyland Power Cooperative for the entire output of the Proposed Action. The Project site is near the point of interconnection to the grid at the American Transmission Company (ATC) Jefferson substation near the intersection of State Trunk Highway 89 and US 18.

Construction equipment would include graders, bulldozers, excavators, forklifts, trailers, plows, trenchers, pile drivers, and directional boring rigs. Vehicles for transporting construction materials and components primarily would be legal load over-the road flatbed and box trucks. Transport would use existing regional roads, bridges, and intersections. Laydown areas would be established within the Project site. Internal site access roads would be required. The site would be fenced.

Potential locations for development of the solar facility in Wisconsin were evaluated in an initial preliminary site review to identify locations where electric transmission infrastructure would be sufficient to connect a solar project to the power grid. The Site Selection Study consisted of three phases of evaluation which began with 18 potential sites and ended with the identification of the Project site in Jefferson County as the most feasible for consideration. The potential impacts of the No Action Alternative and the Proposed Action, construction of the Badger State Solar project in Jefferson County, Wisconsin, are analyzed in Chapter 3.

In the EIS, the effects of the proposal are compared to the existing conditions in the affected area of the proposal. Public health and safety, environmental impacts, socio-economic, and engineering aspects of the proposal are also considered in the EIS.

Summary of Environmental Impacts [EIS Chapter 3]

Comparison of potential environmental impacts of the No Action and Proposed Action Alternatives are compared in Section 2.6, Table 2.6-1 and summarized below. Mitigation measures are summarized in Section 2.5.

Table ES-1. Summary of Potential Impacts

Environmental Resource	No Action Alternative	Proposed Action Alternative
Soils and Geology	• Over time, with continued agricultural use, soils could erode and soil nutrients could be depleted resulting in minor impacts.	• Minor, short-term, direct and soils during ground-disturbing construction and decommissioning, minimized by use of best management practices and implementation of the site-specific Storm Water Pollution Prevention Plan (SWPPP). Minor, long-term, direct impacts to geology during construction during installation of the foundation piles. Minor, long-term direct impacts to soils during operations from maintenance activities.
Water Resources	• Indirect impacts to groundwater resources could result due to the continuing use of the Project site for agriculture. Fertilizers and pesticides may impact groundwater, erosion and sedimentation could also alter runoff patterns. • Surface water quality may degrade further due to runoff from agricultural activity.	• No adverse impacts to groundwater would be anticipated during construction or decommissioning. Impacts to groundwater from operation of the Proposed Action are anticipated to be minor, direct, and long-term associated with use of an onsite well. Changing the primary land use from agricultural to maintained perennial ground cover could result in a minor, beneficial indirect impact to groundwater. • Short-term, minor surface water quality impacts may occur during construction and operation from potential erosion and minimal amounts of hazardous waste generated. After construction is completed, soil stabilization and vegetation management measures would reduce the potential for erosion impacts during operation. Potential long-term indirect beneficial impacts could result from the reduction in agricultural activity at the site.
Air Quality	• There would be no direct or indirect impacts to air quality.	• Minor mobilization of dust and generation of exhaust during construction and decommissioning. During operation, worker vehicles traveling to and from the site and those conducting maintenance activities would emit some pollutants. However, there would be a beneficial effect on air quality and climate change with respect to reduced greenhouse gas emissions.

Environmental Resource	No Action Alternative	Proposed Action Alternative
Acoustic Environment	• The noise condition would remain the same as the existing condition resulting in no direct or indirect impacts to acoustic environment.	• Construction and decommissioning activities would result in short-term, minor noise. Operational activities would result in negligible long-term noise impacts.
Biological Resources	• Vegetation, wetland and riparian resources would remain as they are at the present time. • Wildlife utilization of the agricultural fields would continue. • Indirect impacts to fisheries and aquatic resources could result due to the continuing use of the area as agricultural land. • No impacts to special status species would be expected to occur.	• There would be some localized clearing along fence-lines and small wooded areas. Larger forested areas that are within the fenced areas would be avoided. Once the solar panels and associated facilities have been installed, the surrounding area would be seeded with an appropriate herbaceous seed mix of native species. • No permanent wetland impacts are anticipated. Ten wetlands would be temporarily impacted during construction. Impacts during facility decommissioning would be similar to those during construction. There would be no significant direct or indirect impacts to riparian areas or floodplains from construction, operation or decommissioning. • Direct impacts on wildlife would be minor. • Impacts on fisheries and aquatic resources are expected to be minor given the relatively small extent, size, and number of the waterways potentially affected. Impacts would primarily result from construction and decommissioning activities. Adverse impacts during operation of the solar facility would not be expected. Impacts from decommissioning are expected to be similar to those from construction activities. • Construction, operation, and decommissioning may directly or indirectly affect special status species, if present in the Project area. Adverse effects are expected to be undetectable, not measurable, or extremely unlikely to occur, and implementation of the Proposed Action would not jeopardize the continued existence of these species. Designated critical habitats would not be impacted.
Land Resources	• No impacts would be anticipated as the site would be expected to continue to be utilized for agriculture.	• There would be an overall minor, direct, long-term adverse impact on land use. Decommissioning could allow the majority of the Project site to be returned to agricultural or other uses.

Environmental Resource	No Action Alternative	Proposed Action Alternative
Visual Resources	• There would be no impacts from continued agricultural use. Existing views would be expected to remain unchanged.	• Overall, there would be minor temporary direct and indirect impacts to visual resources during the construction and decommissioning. During operation minor visual impacts would continue to occur in the immediate vicinity due to a combination of changes to the visual attributes of the area, and the existing general local character.
Transportation	• There would be no impacts from continued agricultural use.	• There would be no unreasonable congestion or unsafe conditions with respect to transportation on public roads. Direct impacts associated with construction, and decommissioning be minor, and short-term. During operation increased traffic is expected to have negligible impact on the local roadways. There would be no indirect impacts on transportation resources.
Cultural Resources	• Impacts to cultural resources from continued agricultural use would be expected to be minor.	• Of the identified archaeological resources within the Area of Potential Effect, none are recommended as eligible for the National Register of Historic Places. There would be no adverse effect on NRHP-eligible historical structures.
Public Health and Safety	• Human health and safety issues and hazardous materials and waste management would remain in their current state.	• Overall, impacts to human health and safety related to construction and decommissioning of the solar facility would be temporary and minor. No human health or safety hazards would be anticipated during operations. Processes for hazardous materials and waste management would be in place during construction, operation, and decommissioning, and any potential for impacts would be insignificant.
Socioeconomics	• Socioeconomic impacts would remain in their current state.	• Overall, socioeconomic impacts for the operation of the Proposed Action are anticipated to be positive and long-term, although small relative to the total economy of the region.
Environmental Justice	• There are no identified minority or low-income populations within the site or vicinity, there would be no disproportionately high and adverse direct or indirect impacts on minority or low-income populations.	• No minority or low-income populations have been identified in Jefferson County; therefore, there would be no disproportionate impacts to environmental justice communities.

Conclusion

There would be no impact or minor adverse impacts on soils and geology, air quality, acoustic environment (noise), water resources (including groundwater and surface water), biological resources (including vegetation, wetlands, riparian areas, floodplains, wildlife, fisheries and aquatic resources, and threatened and endangered species), land resources (including prime farmlands), visual resources, transportation, cultural resources and historic properties, public health and safety, and socioeconomics and environmental justice associated with the Proposed Action. Badger State Solar would implement mitigation measures as necessary and appropriate to minimize adverse impacts. Unavoidable adverse effects related to Proposed Action operations would last only as long as the useful life of the solar facility (an expected 40 years). Implementation of the Proposed Action would not result in significant unavoidable adverse impacts, irreversible or irretrievable commitment of resources, or in permanent losses to maintenance or enhancement of long-term productivity of the environment. When the incremental effects from the Proposed Action are considered together with other past, present, and reasonably foreseeable future actions, there would be no cummulative adverse impact.

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LIST OF ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
amsl	above mean sea level
APE	area of potential effects
AST	aboveground storage tanks
ASTM	ASTM International
ATC	American Transmission Company
ATCP	Agriculture Trade and Consumer Protection
BMP	Best management practices
CAA	Clean Air Act
CdTe	cadmium telluride
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CO2	carbon dioxide
CPCN	Certificate of Public Convenience and Necessity
CREC	controlled recognized environmental condition
CWA	Clean Water Act
dBA	A-weighted decibel
DOE	Determination of Eligibility
EIS	Environmental Impact Statement
EMS	emergency medical service
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FPPA	Farmland Protection Policy Act
GHG	Greenhouse gases
HDD	horizontal directional drill
HREC	historical recognized environmental condition
IPaC	Information for Planning and Consultation
JDA	Joint Development Agreement
km	kilometers
KOP	Key Observation Point
kV	kilovolt
MBTA	Migratory Bird Treaty Act
mi^2	square miles
MISO	Midcontinent Independent System Operator, Inc.

MMI	Modified Mercalli Intensity
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
OHWM	Ordinary High Water Mark
PM_{10}	particulate matter with diameters up to 10 micrometers
$PM_{2.5}$	particulate matter with diameters up to 2.5 micrometers
PSCW	Public Service Commission of Wisconsin
PV	photovoltaic
RCRA	Resource Conservation and Recovery Act
REA	Rural Electrification Act of 1936
REC	recognized environmental conditions
ROD	Record of Decision
RUS	Rural Utility Service
SHPO	State Historical Preservation Officer
SPCC	spill prevention, countermeasures, and control
SWPPP	Storm Water Pollution Prevention Plan
U.S.C.	United States Code
US	United States
US 18	US Highway 18
USACE	US Army Corps of Engineers
USDA	US Department of Agriculture
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
WDNR	Wisconsin Department of Natural Resources
WDOT	Wisconsin Department of Transportation
WEPA	Wisconsin Environmental Policy Act
WEPA	Wisconsin Environmental Policy Act
WisCALM	Wisconsin Consolidated Assessment and Listing
WRP	Wetlands Reserve Program

1.0 INTRODUCTION

This chapter describes the purpose and need for the project proposal (Proposed Action or Project) and the purpose and need for the United States (US) Department of Agriculture (USDA), Rural Utility Service (RUS) action, other agency actions, authorizing actions, public participation, scoping, and issues associated with the Proposed Action.

This Environmental Impact Statement (EIS) was prepared in accordance with the National Environmental Policy Act of 1969, as amended (NEPA; 42 United States Code [U.S.C.] Annotated Sec. 4321 to 4370e) and in compliance with all applicable regulations and laws, including the Council on Environmental Quality (CEQ), Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, (40 Code of Federal Regulations (CFR) Part 1500) and USDA, Rural Development, Environmental Policies and Procedures (7 CFR Part 1970).

1.1 Purpose and Need for the Project Proposal

1.1.1 Description of Project Area and Project Proposal

Badger State Solar, LLC (Badger State Solar) proposes to construct, install, operate, and maintain a 149 megawatt (MW) photovoltaic (PV) alternating current solar energy generating facility (Project) on a site in the Townships of Jefferson and Oakland, west of the City of Jefferson, in Jefferson County, Wisconsin (Figure 1.1-1). Bader State Solar estimates the total Project cost would be approximately $225,000,000. Project construction would begin in October 2022. Construction would be complete and the project would be expected to come online by Fall 2023.

The Proposed Action would take place on approximately 1,200 acres located on the north and south sides of US Highway 18 (US 18), approximately 2-miles west of the City of Jefferson (Figure1.1-2). A majority of the Project site would be located west of State Highway 89. The proposed collector substation would be located within the Project site.

1.1.1.1 Site Description

The Project site has a gently rolling surface topography including some small hills and depressions with average slopes less than 2 percent. Elevation ranges from 840 to 1,000 feet above sea level. Slopes in the western parts of the Project area range from 0 to 15 percent. Site land cover is predominantly cultivated crops with some hay and pasture. Small areas of deciduous and evergreen forest and woody and herbaceous wetlands are present within the Project boundary.

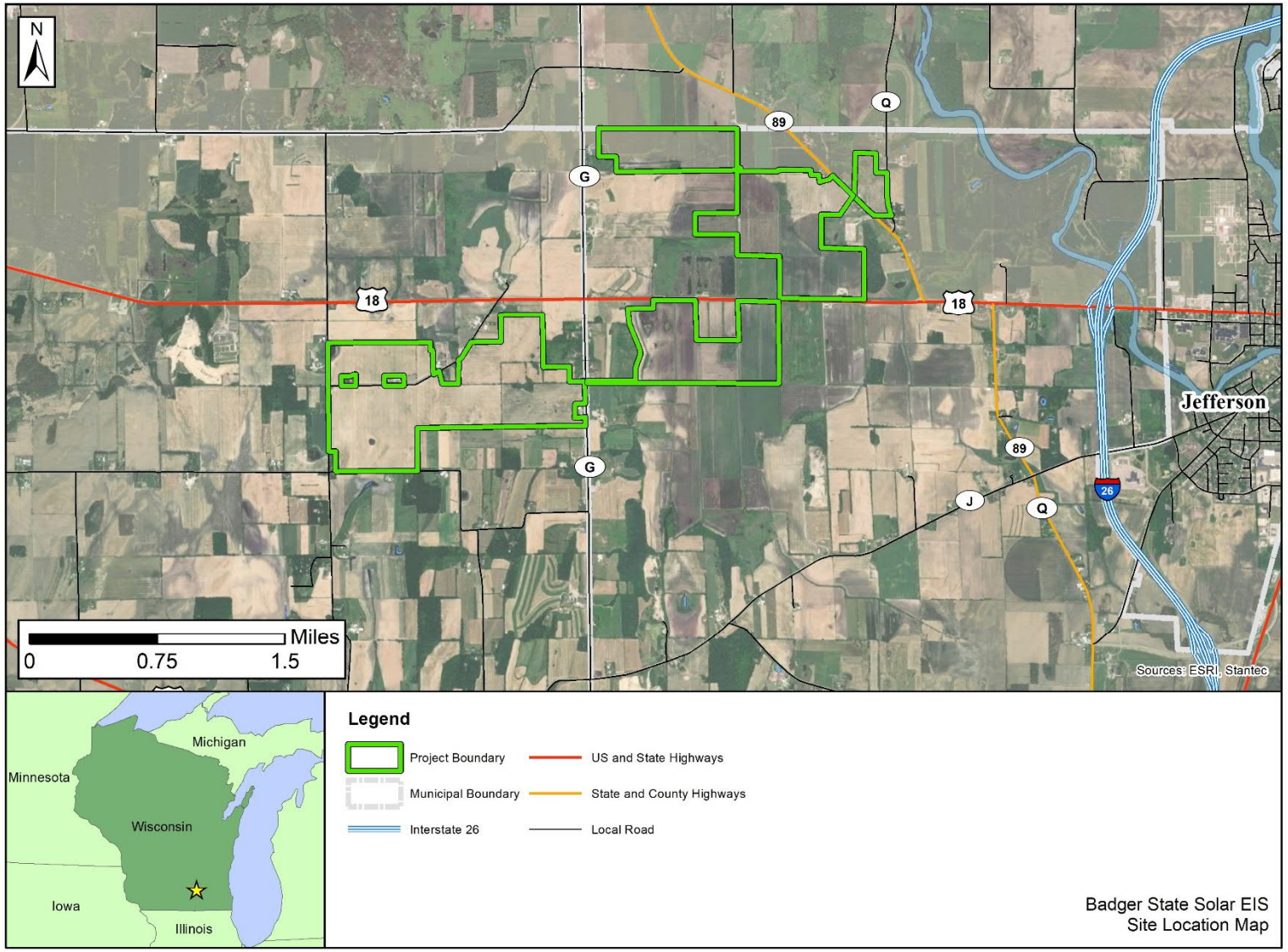

Figure 1.1-1. Badger State Solar Site Location Map

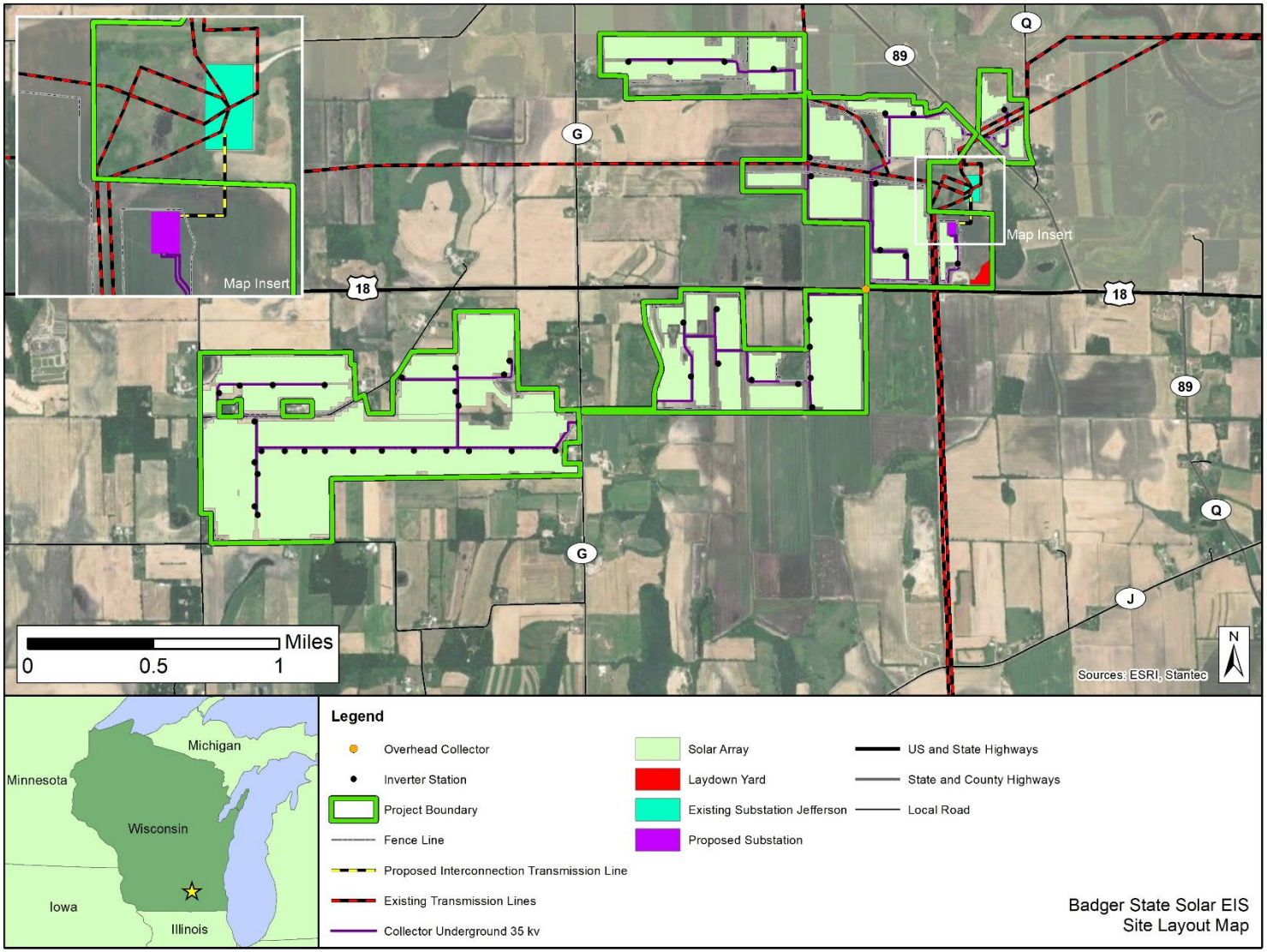

Figure 1.1-2. Badger State Solar Site Layout Map

1.1.1.2 Generating Facility Description

The proposed solar array facility would consist of 487,848 single-axis tracking PV panels. The PV panels would be mounted on a steel racking frame. Supporting facilities include an electrical substation. The lease agreement allows for an operating period of 40 years. A power purchase agreement has been executed with Dairyland Power Cooperative (Dairyland Power) for the entire electrical output of the Proposed Action. The Project site is near the point of interconnection to the grid at the American Transmission Company (ATC) Jefferson substation near the intersection of State Trunk Highway 89 and US 18 (see Figure 1.1-2).

The solar facility would be interconnected to the transmission grid through the existing ATC substation located to the northeast of the proposed substation and would require a short 138 kilovolt (kV) overhead line between the two stations. Laydown areas and a Laydown Yard would be established within the Project site as shown on Figure 1-1.2. The entire solar site would be fenced.

1.1.1.3 Solar Panels

The initial Proposed Action was designed for approximately 487,848 panels with a generating capacity of 180 MW to 204.9 MW and based on the module wattages under consideration and the PV tracker system selected, the final solar panel could range from approximately 450,000 to 550,000. The Project area is suitable to host facilities to achieve the full 149 MW nameplate capacity using the proposed single axis tracking system. The actual number of solar panels would depend upon final engineering design and configuration and the capacity of solar panels available on the market at the start of construction and is expected to be less than 487,848 solar panels.

The PV modules would be plate glass and comprised of approximately 72 cells with an aluminum frame (approximate dimensions of 1 by 2 meters). The PV modules would be connected in series and mounted on a tracker system. Modules would be mounted on racking and oriented to track east to west to follow the sun throughout the day. Selection of the final racking system would be determined during engineering design.

The solar panels would be mounted on steel racking frames positioned 3 to 7 feet from the finished ground surface. The solar panels would have a +\- 60-degree range of motion (single axis tracking) and would be driven by electric motors. The single axis tracking system is anticipated to be mounted on steel piles or helical piles that would be driven or screwed into the ground. The horizontal tracker would be in its highest position (a maximum of 12 feet above grade) during the morning and evening hours when the trackers are tilted at their maximum angle. The bottom edge of the modules would be a minimum of 1 foot above grade at maximum tilt, and up to 4 feet above grade when tilted flat at mid-day.

The complete tracker system would be arranged into rows of individual trackers with an estimated length of 250 feet by 7 feet (when panels are in a horizontal position). Gaps

would be placed between sections or groups of sections to allow maintenance personnel to access the entire site. The individual trackers and supporting piles would be oriented in rows from north to south. Approximately 63,306 foundation piles installed 6 to 10 feet deep would be used for the Proposed Action. The solar trackers are anticipated to be self-powered, although some tracker systems currently available require external power from an auxiliary power source.

1.1.1.4 Access Roads

Existing public roadways would be used to access the site. Internal roads on the solar facility site are expected to be between 12 and 15 miles in length. Construction matting may be used to a limited extent in areas with soil strength limitations. The existing soil surface would remain intact, planted in perennial vegetation, and maintained during operation and maintenance once construction is completed.

Aggregate materials would be used at roadway approaches to the site and/or in areas with frequent vehicle traffic to support construction vehicles when needed based on soil limitations. Topsoil would be removed and stored for reclamation during decommissioning. Geotextile matting would be installed prior to placement of aggregate to prevent mixing with native subsoil. The aggregate would be maintained for the life of the Proposed Action where needed.

1.1.1.5 Collector Circuits and Substation

The solar facility would include underground collector circuits and a substation. Approximately 25 miles of collector cable would be directly buried cables or cables in buried ducts. There would be approximately 10.5 miles of collector circuits installed by trenching and approximately 0.4 miles installed by directional boring.

The underground collector system would be buried at a depth of 36 inches to the top of the cables in 1-foot-wide trenches. Where multiple cables are installed parallel to each other, the width of the trench would vary based on the number of collector circuits within the trench.

There would be an overhead crossing spanning a distance of 375 feet to avoid boring under US 18. The overhead span would be 17 feet above the roadway supported by two to four poles with a minimum of 15 lines.

The Proposed Action would include a collector substation with a 138/34.5 kV main transformer. The substation footprint is expected to be 280 feet by 195 feet. The substation would generally contain switching gear, metering and instrumentation, circuit breakers, and supporting equipment. There would be a protection and control building, internal access roads, security fencing, buried power cables, lightning protection masts, and yard lighting for use during maintenance or emergency activities.

1.1.1.6 Construction

Construction is anticipated to begin in the fourth quarter of 2022 and conclude in the fourth quarter of 2023. Approximately 50 percent of the construction workforce is expected to come from local sources, depending on the labor market conditions and local workforce availability at the time of construction.

Construction equipment would include graders, bulldozers, excavators, forklifts, trailers, plows, trenchers, pile drivers and directional boring rigs. Typical construction equipment and uses are shown in Table 1.1-1.

Table 1.1-1. Construction Equipment (Typical Solar Project)

Equipment	Use
Concrete Mixing Trucks	Delivery of concrete used for slabs and foundations
Bulldozers/Loaders/Backhoes	Grading, clearing, grubbing
Excavators	Trenching and foundations
Forklifts	Move materials, loading and unloading of trucks
Directional Boring Rigs	Boring under sensitive resources
Graders	Access road and driveway leveling
Trailers	Office space and storage of equipment/supplies
Flatbed and Box Trucks	Transporting construction materials and components
Pile Drivers	Drive structure posts
Plows/Trenchers	Light trench work
Storage/Disposal Containers	Storage/Disposal of onsite materials and construction debris
Service Trucks	Maintenance of heavy equipment
Personnel transport vehicles	Transport workers
Water Trucks	Dust control as needed

It is anticipated that the majority of vehicles for transporting construction materials and components would be legal load over-the-road flatbed and box trucks. Transport of materials would use existing regional roads, bridges, and intersections (Figure 1.1-3). Laydown areas would be established within the Project site. Internal site access roads would be required.

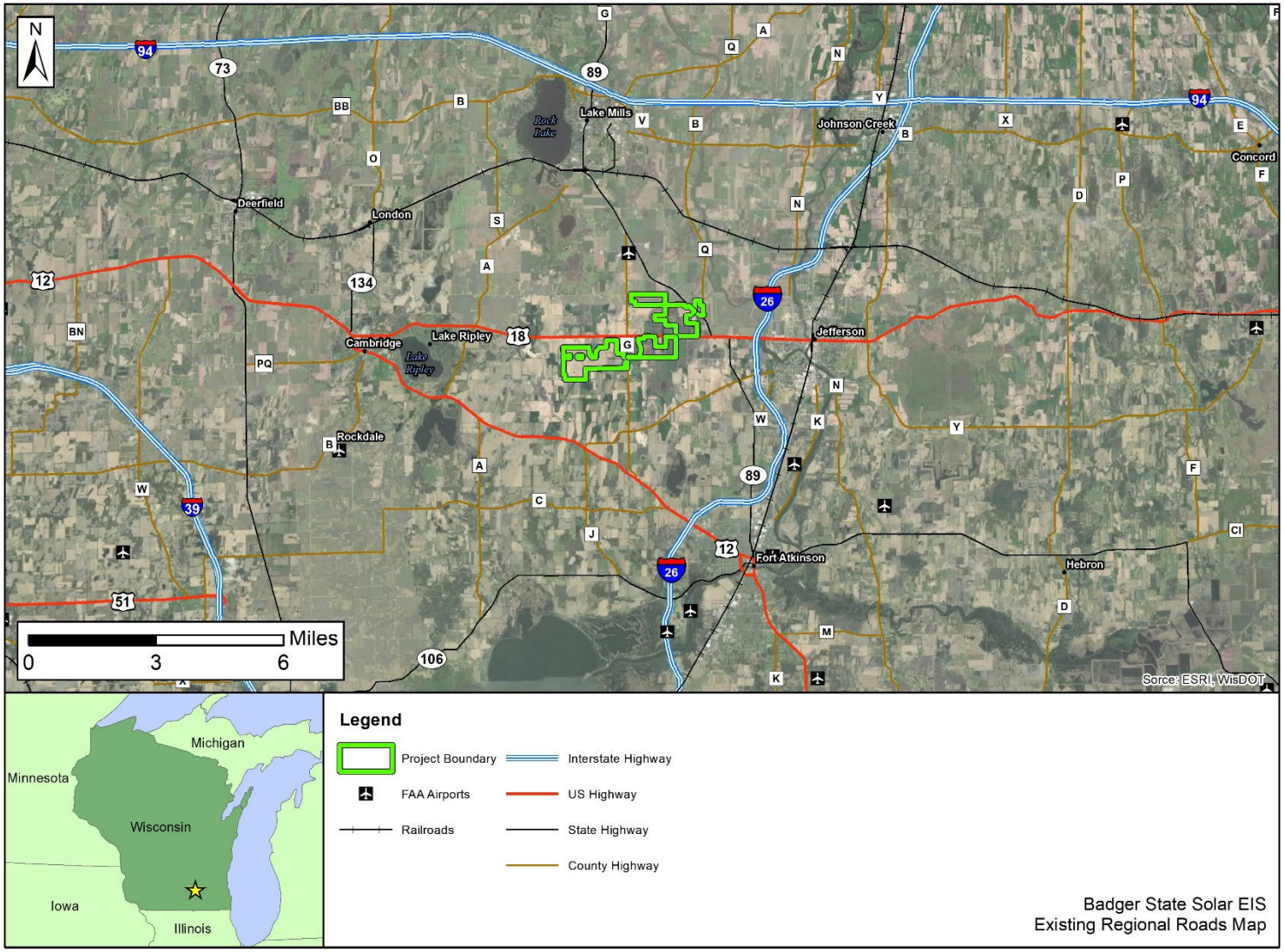

Figure 1.1-3. Existing Regional Roads

Clearing and grading would be conducted as needed to establish site access, internal access roads, staging/laydown areas, foundations, substation, and the solar array field. Panel arrays would be designed and constructed to conform to the existing topography to avoid the need for significant grading. Access roads would be constructed as close to existing grade as possible, maintaining preconstruction hydrologic flow patterns. The proposed solar site is predominately in agricultural use at this time. The majority of the Project site would not require clearing and grubbing. It is anticipated that approximately 2.5 acres of clearing and grubbing would be necessary with not more than 2 acres of tree clearing.

As part of the Joint Development Agreement (JDA) with local governments, Badger State Solar would fund a vegetative buffer for adjacent, non-participating landowners whose primary residence is in direct view of the solar arrays. Following construction, prairie-style vegetation consisting of native grasses and flowering plants would be planted between the property line and fence line of the Proposed Action.

Further field investigation of drain tile networks would be conducted prior to initiation of construction activities. The locations of active (functioning and necessary) drain tile systems would be identified to avoid drain tile locations within the Project site; re-route drain tile systems away from locations susceptible to damage from construction; or where agricultural fields with pattern tile networks are present. Badger State Solar would work with landowners to establish acceptable criteria for rerouting, replacing or abandoning in place drain tile systems within the PV array.

1.1.1.7 Operations and Maintenance

Badger State Solar anticipates that the solar facility would be staffed with full-time technicians. An average of two employees would be onsite for two days each week during operations. Monitoring of conditions would take place on a regular, on-going basis. The onsite technicians would monitor and maintain the solar array, ground cover, and substation. Maintenance would be based on facility needs and industry best practices for operations and maintenance. In addition to onsite personnel, the solar facility performance would be remotely monitored. Planned maintenance would take place per manufacturer’s specifications, monthly, or annually as appropriate.

Planned inspections would include the solar panel racking system, junction box, combiner box, perimeter fencing, and roads. Pest and erosion control maintenance would be carried out as needed.

Pre-existing conditions of access roads would be documented before construction. At the conclusion of construction, Badger State Solar would return any damaged portions of roadways to pre-construction condition or compensate local governments as required.

Routine annual vegetation maintenance would be carried out. This would include mowing, invasive plant control, trimming or tree removal, and perimeter fence vegetation management.

Solid waste would be recycled where commercially possible. Waste that could not be recycled would be disposed of at an appropriately permitted waste disposal facility. A well or water tank would be installed to support water requirements. Water for washing the solar array panels would be procured under agreement with local landowners, through installation of onsite wells, or by use of water trucks. The Operations and Maintenance building would have a septic system.

1.1.1.8 Decommissioning

The expected life of the proposed solar array is 35-40 years. Following the useful life of the solar array facility, it would be decommissioned and the area would be restored to pre-construction condition for agricultural use.

Decommissioning activities would require approximately 12 months to complete. In general, decommissioning activities would include:

1. Dismantling and removal of above-ground equipment and structures, including solar panels, panel racking, transformers, and the onsite substation;
2. Excavation and removal of cabling;
3. Removal of foundations including piles, piers, and posts;
4. Removal of underground cables in accordance with landowner lease agreements; and
5. Scarification of compacted areas within and contiguous to the solar facility, including but not limited to internal and external access roadways.

Decommissioning of the gen-tie line, telecommunication lines, and collector substation would involve:

1. Dismantling and demolishing above-ground structures;
2. Removal of concrete foundations;
3. Excavation and removal of soils and broken concrete from the site; and
4. Surface contouring to return disturbed areas to pre-construction conditions.

To restore areas to conditions suitable for agricultural production, the land would be tilled to break up the soil and the vegetation cover established for the Proposed Action.

1.1.2 Purpose and Need for the Action

Many of Wisconsin's fossil-fueled power plants are scheduled to cease power generation over the next several years. Six of the 12 coal-fired power plants in Wisconsin have been retired or are scheduled to go offline, including Dairyland Power's Genoa #3 coal-fired power plant which closed in June 2021. Dairyland Power has announced a Sustainable Generation Plan that includes goals of reducing its carbon dioxide intensity rate by 50 percent and increasing renewable power generation 30 percent by 2030. Badger State Solar entered into a power purchase agreement with Dairyland Power for the entire electrical output of the Proposed Action, which will contribute to Dairyland Power's effort to achieve its Sustainable Generation Plan goals. The Applicant's purpose and need for the Proposed Action is to develop a utility-scale solar facility in Jefferson County, Wisconsin, to replace load demand on local utilities, including Dairyland Power, resulting from coal-fired power plant closures or scheduled decommissioning.

1.2 Purpose and Need for Agency Action

The Rural Electrification Act of 1936 (REA), as amended (7 USC 901 *et seq*.) authorizes the Secretary of Agriculture to make rural electrification and telecommunication loans, and specifies eligible borrowers, references, purposes, terms and conditions, and security requirements. RUS is authorized to make loans and loan guarantees to finance the construction of electric distribution, transmission, and generation facilities, including system improvements and replacements required to furnish and improve electric service in rural areas, as well as demand-side management, electricity conservation programs, and on- and off-grid renewable electricity systems.

The Applicant has indicated the intention to request financing assistance from RUS for the Proposed Action's 149-MW solar array in Jefferson County, Wisconsin. RUS's proposed federal action is to decide whether or not to provide financing assistance for the Proposed Action.

- As part of its review process, RUS is required to complete the NEPA process along with other technical and financial considerations in processing the Applicant's application. RUS agency actions include the following: provide engineering reviews of the purpose and need, engineering feasibility, and cost of the Proposed Action.
- Ensure that the Proposed Action meets the borrower's requirements and prudent utility practices.
- Evaluate the financial ability of the borrower to repay its potential financial obligations to RUS.

- Ensure that NEPA and other environmental laws and requirements and RUS environmental policies and procedures are satisfied prior to taking a federal action.

While RUS is authorized under REA to finance electric generation infrastructure in rural areas, it is the Midcontinent Independent System Operator, Inc. (MISO), not RUS, who is responsible for electric grid planning. The Proposed Action is a key component of Dairyland Power's generating capacity projection for both the MISO Resource Adequacy requirements and the Minnesota and Wisconsin renewable energy requirements. The Proposed Action will allow Dairyland Power to simultaneously meet its generating capacity needs and its sustainability goals.

Supporting renewable energy projects meets both RUS's goal to support infrastructure development in rural communities and USDA's support of the June 2013 Climate Action Plan, which encourages voluntary actions to increase energy independence.

AECOM, on behalf of RUS, prepared this third-party EIS in accordance with RUS RD Instruction 1970-D Exhibit B EIS Outline. RUS has completed an independent analysis of this EIS and concurs with its scope and content. In accordance with 7 CFR Part 1970, RUS has conducted an independent evaluation of this EIS and believes it accurately assesses the impacts of the Proposed Action.

1.3 Rural Utilities Service

USDA RUS is the lead Federal agency responsible this EIS.

1.3.1 Other Agencies

Federal agencies with jurisdiction or environmental impact expertise are identified in Table 1.4-1. The US Army Corps of Engineers (USACE) requested to be a consulting party for Section 106 during the interagency scoping meeting. No state or local agencies or tribal governments requested to become cooperating or consulting parties. State and local agencies would participate in the NEPA process through review of the EIS and issuance of permits or approvals.

1.4 Authorizing Actions

1.4.1 Applicable Statutory Requirements

Badger State Solar submitted an Application for a Certificate of Public Convenience and Necessity (CPCN) to the Public Service Commission of Wisconsin (PSCW). Consultations have been conducted with the Wisconsin Department of Natural Resources (WDNR) and an endangered resource review has been submitted to the agency. Consultations with other agencies include the Federal Aviation Administration (FAA) and informal consultation with the US Fish and Wildlife Service (USFWS). Badger State Solar also has consulted property owners, local town and county officials and staff, state elected representatives, Wisconsin Department of Agriculture Trade and

Consumer Protection (ATCP) and engaged the general public. Other agencies with permit and approval authority for the Proposed Action are listed in Table 1.4-1. The agencies provided with a notification of the availability of the Draft EIS are listed in Appendix B.

Table 1.4-1. Badger State Solar Permits and Approvals

Agency	Permit, Regulatory Compliance, or Coordination
Federal	
US Fish and Wildlife Service (USFWS)	• Section 7 of the Endangered Species Act, Migratory Bird Treaty Act of 1918, and Bald and Golden Eagle Protection Act of 1972
US Army Corps of Engineers (USACE)	• Sections 401 and 404 of the Clean Water Act (CWA)
Federal Aviation Administration (FAA) FAA Notice Criteria Tool	• Navigable Airspace Review (14 CFR 77.13(a))
USDA – Natural Resources Conservation Service (NRCS)	• Farmland Conversion Form – Form AD-1006
State	
Public Service Commission of Wisconsin (PSCW)	• Certificate of Public Convenience and Necessity (CPCN)
Wisconsin Department of Natural Resources (WDNR)	• Wisconsin Endangered Species Law (Wisconsin Statutes s. 20.604) • Section 401 or the CWA, Water Quality Certification and State-Regulated Wetlands (Isolated Wetland Permit) • Wisconsin Navigable Waters, Harbors and Navigation (Chapter 30), if applicable • Wisconsin National Pollutant Discharge Elimination System (WNPDES)/Stormwater Runoff Permit (NR216) • Request for well number (Wisconsin Statutes s.281.34(3)
Wisconsin State Historical Society-Historic Preservation Office (SHPO)	• Section 106 of the National Historic Preservation Act (NHPA) Consultation
Wisconsin Department of Transportation (WisDOT)	• Utility permit to construct, operate or maintain a utility facility on state trunk highway (Wisconsin Statutes s. 66.0831, 84.08, 85.15, 86.07(2)(a), 86.16, 182.017, other applicable statutes) • Driveway/access permit (Wisconsin Statutes s. 86.07(2) and Chapter Trans 232 Wisconsin Administrative Code • Oversize/overweight permit (Wisconsin Statutes s.348.26(2), (3)
State of Wisconsin, Division of Safety and Buildings (or Town depending on scope of building)	• Building Permit (Wisconsin Statutes 101.63 and 101.73)
County	
Jefferson County Land Management and Zoning	• Jefferson County Shoreland Zoning • Jefferson County Floodplain Zoning

Agency	Permit, Regulatory Compliance, or Coordination
Jefferson County Highway Department	• Oversize-overweight permit (Wisconsin Statutes s 348.26(2), (3) • Utility permit for boring electric line under County Highway
Jefferson County Land Conservation Department	• Stormwater Management and Erosion Control (plan and permit)
Jefferson County	• Permit to Construct, Maintain or Repair Utilities Within Highway Right-of-Way • Building/Construction/Electrical Review • Sanitary Permit
Jefferson County Highway Department	• County Highway Entrance Permit, Road Use Agreements
Jefferson County Farm District Drainage No. 16	• Drainage Alteration Permit (ATCP 48.34 Subchapter V)
Local	
City of Jefferson	• Driveway Permits • Sign Permit • Building/Construction/Electrical and Erosion Control Permit
Town of Oakland	• Driveway Permits

1.4.2 Federal and State EIS Requirements

Badger State Solar has indicated that it will request financing from RUS's Electric Program for development of the Proposed Action. Approval of such financing through RUS represents a major Federal action subject to review under NEPA, and all applicable Federal environmental laws and regulations.

1.4.2.1 Federal Requirements

Per 7 CFR Part 1970.151(b)(2), RUS actions for which an EIS is required include proposals for new electric generating facilities, other than gas-fired prime movers (gas-fired turbines and gas engines) or renewable systems (solar, wind, geothermal), with a rating greater than 50 average MW and all new associated electric transmission facilities. The proposed facility is 149 MW generating facility and would include a short 138 kV generator tie line. Per 7 CFR Part 1970.151(b)(3), an EIS is also required for proposals that change or convert land use for more than 640 contiguous acres.

This EIS has been prepared to analyze potential impacts to the natural and human environments associated with the Proposed Action in accordance with 7 CFR Part 1970, RUS' Environmental Policies and Procedures, and 40 CFR 1500-1508, the regulations promulgated by the CEQ for implementing NEPA.

1.4.2.2 State Requirements

PSCW and WDNR are responsible for coordination of environmental reviews for compliance with the Wisconsin Environmental Policy Act (WEPA). PSCW and WDNR must comply with WEPA when reviewing proposed energy construction projects,

including electric generating and transmission projects seeking PSCW statutory approval. WEPA applies only to actions of state agencies. However, the environmental impact of the Proposed Action was reviewed by PSCW, in coordination with WDNR, as part of the application for a CPCN. PSCW issued an Order approving the CPCN application subject conditions issued in the Final Decision on February 26, 2020 (Docket 9800-CE-100) (PSCW 2020).

1.4.3 Decisions to be Made Based on this Analysis

Based on the outcome of this environmental impact analysis, RUS would decide whether or not to distribute funds for financing the implementation of the Proposed Action.

1.4.4 List of All Federal, State, and Local Permits and Actions Required to Implement Project Proposal

The Proposed Action must comply with the following permits and approvals (Table 1.4-1).

1.5 Public Participation

The public was informed of the Proposed Action through the Notice of Intent (NOI) to prepare the Badger State Solar EIS and the intent to hold a virtual public meeting. Notices of Availability of the Draft EIS and Final EIS informed the public when these documents were available for public review and where these documents could be found.

As part of its broad environmental review process, RUS must take into account the effect of the proposal on historic properties in accordance with Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulation, ‘‘Protection of Historic Properties’’ (36 CFR part 800). Pursuant to 36 CFR 800.2(d)(3), RUS is using its procedures for public involvement under NEPA to meet its responsibilities to solicit and consider the views of the public during Section 106 review. Section 106 review requires Federal agencies to consider the effects of proposed actions on historic properties. Accordingly, comments submitted during the public involvement process will inform RUS’s decision-making during Section 106 review.

Badger State Solar also has consulted property owners, local town and county officials and staff, state elected representatives, Wisconsin ATCP, and engaged other public groups and the general public. Site landowners, tenants, and residents near the Project site were consulted early in the Proposed Action development to determine local interest (Stantec 2021b). State, county and town elected officials and staff were consulted to gauge interest in a solar facility and to understand permitting requirements. Local newspapers and radio stations were contacted. Community outreach meetings were held to share information about the Proposed Action and to receive feedback.

1.5.1 Scoping Process

1.5.1.1 Federal Requirements

As part of the scoping process, the NEPA regulations require Federal agencies to:

- Hold scoping meetings;
- Invite the participation of affected Federal, state, and local agencies, any affected Indian tribe, the proponent of the action, and other interested persons;
- Determine the scope and significant issues to be analyzed in depth in the EIS; and
- Identify and eliminate issues that are not significant.

The NOI to prepare the Badger State Solar EIS and to hold a virtual public scoping meeting was published in the Federal Register on October 5, 2021 initiating the EIS review process. The NOI notified affected Federal, state, and local agencies, Native American Tribes, and other stakeholders to inform them of the Proposed Action and invited them to comment on the Proposed Action and assist in identifying the required permits and approvals that must be obtained and the administrative procedures that must be followed. The NOI also announced a virtual public scoping meeting held on October 26 at 7 pm eastern/6 pm central via Zoom. RUS also hosted an interagency meeting on October 28 at 10 am eastern/9 am central via Microsoft Teams.

In addition to the NOI, a notice was published in the *Daily Jefferson County Union* and *Watertown Daily Times* newspapers published on October 6, 7, and 8, 2021. Copies of the tearsheets from these publications are provided in the Scoping Report (Appendix A). The NOI and other project information, including the Alternative Evaluation and Site Selection Studies was available for review on the RUS and Badger State Solar websites (https://www.rd.usda.gov/resources/environmental-studies/impact-statements, https://badgerstatesolar.consultation.ai, and https://www.badgerstatesolar.com) and also at the following locations (Jefferson Public Library in Jefferson, WI; the Cambridge Community Library in Cambridge, WI and the Lake Mills Library in Lake Mills, WI).

A total of two individuals attended the virtual public scoping meeting and seven individuals from various state and Federal agencies and local governments attended the interagency scoping meeting and participated in the discussion. No comments were received during the public scoping meeting. Comments received during the interagency meeting were focused on transportation topics (pertaining to access points/restrictions and permitting), wetlands and waterways, and the rusty patched bumblebee. The only written submittal received during the scoping period was a request from USACE to be a consulting party on the Proposed Action. The scoping process and public participation in scoping was summarized and addressed in a Scoping Report provided in Appendix A.

1.5.1.2 State Requirements

As described in Section 1.4.2, the WEPA requires state agencies to analyze and disclose the anticipated environmental impacts of proposed actions. An EIS may be prepared at state agencies' discretion. The environmental impact of the Proposed Action was reviewed by the PSCW, in coordination with WDNR, as part of the application for a CPCN. RUS also invited the state agencies to provide comments during the scoping process.

1.5.2 Public Review and Comment

The Notice of Availability for the Badger State Solar Draft EIS was published in the Federal Register on March 4, 2022, beginning the 45-day public and agency review period. The availability of the Draft EIS was also announced in the *Daily Jefferson County Union* and *Watertown Daily Times*. The list of stakeholders notified regarding the availability of the Draft EIS is included in Appendix B. The Draft EIS was available for review on the RUS and Badger State Solar websites (https://www.rd.usda.gov/resources/environmental-studies/impact-statements, https://badgerstatesolar.consultation.ai, and https://www.badgerstatesolar.com) and also at the following locations (Jefferson Public Library in Jefferson, WI; the Cambridge Community Library in Cambridge, WI and the Lake Mills Library in Lake Mills, WI). Public comments received during the 45-day review period, by April 18, 2022, will be considered and addressed in the Final EIS and summarized in Appendix C.

1.6 Issues Associated with the Project Proposal

In the EIS, the effects of the proposal are compared to the existing conditions in the affected area of the proposal. Issues of concern evaluated in the EIS include: soils and geology, water resources, air quality, acoustic environment, biological resources, land resources, visual resources, transportation, cultural resources, site contamination, public health and safety, socioeconomics, and environmental justice.

1.6.1 Key Issues

No key environmental issues were identified during the scoping period.

1.6.2 Issues Considered but Dismissed

No significant or key environmental issues were identified during scoping. Anticipated impacts for each environmental resource that would potentially result from development and operation of the solar facility was evaluated in the detailed analysis in Chapter 3.0 and results are compared in Table 2.4-1.

1.7 Connected Actions

Connected actions would be those that are necessary as a result of implementing the Proposed Action. Examples would be other facility or infrastructure development or

modifications to support the Proposed Action. There are no foreseeable connected actions beyond those described in Section 1.1.1.2 and that are necessary for the development and operation of the Proposed Action.

2.0 SUMMARY OF ALTERNATIVES

Badger State Solar conducted preliminary reviews to identify potential sites for the solar facility in the state of Wisconsin. Eighteen preliminary sites were identified for further screening in the site selection process to evaluate site alternatives.

2.1 Development of Alternatives

Energy technology alternatives were considered in the planning and development of the Proposed Action. As discussed in Section 1.1.2, many of Wisconsin's fossil-fueled power plants are scheduled to cease power generation over the next several years. Dairyland Power needs to replace this capacity while meeting renewable energy goals.

2.1.1 Energy Technology Alternatives

Dairyland Power's Minnesota retail members are allowed to distribute solar- and wind-generated energy. However, these renewable energy sources provide only 23.2 MW of generation from solar and 1.1 MW of generation from wind (Stantec 2021a). The Proposed Action would add 149 MW of solar generation to Dairyland Power's system. Distributed power generation from member cooperatives cannot offset the capacity demand created by the closures of fossil-fueled power plants. Further, solar-generated energy provides an advantage over other renewable energy generation sources since the peak electricity generation by solar is during daytime hours when energy demand also peaks.

Dairyland Power has a goal of 50 percent reduction in carbon dioxide intensity rate by 2030 and increase renewable energy production (Stantec 2021a). To meet these goals, additional renewable energy sources are needed to offset the loss of fossil-fuel energy production.

Although Dairyland Power would continue to evaluate other renewable and non-renewable energy production sources, those actions are outside of the purview of Badger State Solar and RUS. Therefore, alternative technologies other than solar power generation were not considered further in this EIS and the alternatives analysis is focused on solar energy facility siting alternatives for the Badger State Solar facility.

2.1.2 Solar Facility Site Alternatives

Potential locations for development of the solar facility in Wisconsin were evaluated in an initial preliminary site review to identify locations where electric transmission infrastructure would be sufficient to connect a solar project to the power grid. This resulted in 18 locations that were evaluated in a phased site selection approach (see Section 2.1.1 and Figure 2.1-1).

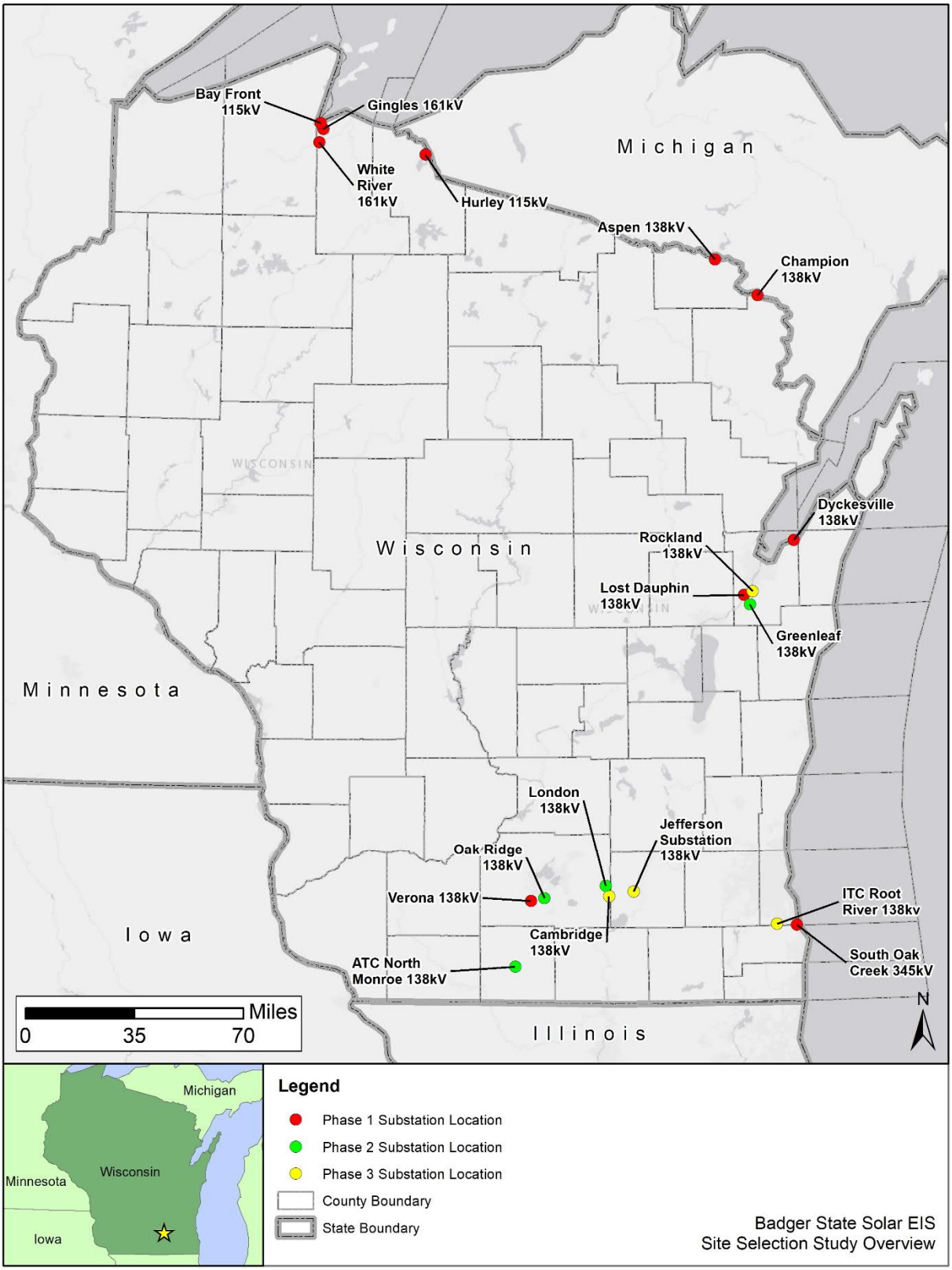

Figure 2.1-1. Site Selection Study Overview

Five potential site locations were eliminated because of their remote location (i.e., not near a major load center) and solar resource availability (i.e., located in northern Wisconsin). These sites were Aspen 138kV, Gingles 161kV, Hurley 115 kV, White River 161 kV, and Champion 138 kV. Five other potential site locations were eliminated due to land constraints, primarily because of their location near populated areas, environmental features, or other facilities which limited the available acreage for the solar facility. These sites and the reasons for elimination were:

- Verona 138 kV – existing substation located adjacent to a Madison suburb had limited land acreage in proximity to the substation,
- Dyckesville 138 kV – proximity of the site to Green Bay and the wooded area surrounding the existing substation reduced available land acreage,
- Lost Dauphin 138 kV – residential development and presence of a waterway and associated floodplain restricted land area available,
- Bay Front 115 kV – residential development and proximity to Chequamegon Bay restricted land area available, and
- South Oak Creek 345 kV – suburban area not suitable for development and close proximity to a coal fired power plant and Lake Michigan.

Eight of the 18 potential sites were carried forward in the detailed evaluation process described below.

2.1.3 Evaluation Process and Criteria

Site selection alternatives were evaluated in three phases: Phase 1 to identify electrical substations that would be suitable as points of interconnection, Phase 2 to identify feasible project sites and evaluate site constraints; and Phase 3 to select the preferred project site (Stantec 2021a).

Phase 1 screening is discussed in Section 2.1.2. Phase 1 screening resulted in eight feasible sites that were carried into the Phase 2 constraints analysis:

- Jefferson 138 kV (Badger State Solar Primary Area)
- Cambridge 138 kV
- Greenleaf 138 kV
- London 138 kV
- North Monroe 138 kV
- Oak Ridge 138 kV
- Rockland 138 kV
- Root River 138 kV

The following constraints were evaluated for the eight feasible site alternatives in Phase 2. In some cases, when a significant constraint was identified for one or more of these

criteria, the site was eliminated without evaluating the other criteria (for example, Oak Ridge):

1. Land use – sufficient size tracts of land; agricultural land was preferred
2. Landowners – potential host landowners were contacted to gauge interest in hosting the solar facility
3. Environmental Constraints – including presence of wetlands, waterways, trees, critical habitat, endangered species, and hydric soils
4. Cultural and Historic Resources – archaeological, cultural, and historic resources
5. Community – acceptance of the solar facility
6. Constructability – topography, soils, and subsurface geology
7. Road Infrastructure – highways and roads in the vicinity must be accommodate large construction vehicles and delivery trucks

The siting approach focus was on avoiding floodplains, minimizing wetland impacts, and avoiding cultural or historical features to the extent feasible.

Findings for these eight feasible alternative sites are shown in Table 2.1-1.

Table 2.1-1. Summary of Feasible Alternative Site Constraints and Findings

Evaluation Criteria	Substation							
	Jefferson 138 kV	**Cambridge 138 kV**	**Greenleaf 138 kV**	**London 138 kV**	**North Monroe 138 kV**	**Oak Ridge 138 kV**	**Rockland 138 kV**	**Root River 138 kV**
Land Use	-	Limited Land (<500 ac.)	Limited Land (<500 ac.)	Limited Land (<500 ac.)	-	Residential Density	-	Residential Density
Environmental Concerns	-	Floodplain, River, Wetland, Woodland	Floodplain, Wetlands, Waterways	Floodplain, River, Wetlands, Woodland	-	-	Floodplain, Wetlands, Waterways	Floodplain, Wetlands, Waterways
Cultural/ Historic Resources	-	-	-	-	-	-	-	-
Community	-	Village of Cambridge	-	Village of Deerfield	-	-	City of DePere	City of Franklin
Interconnection Point	-	-	-	-	System Upgrade Required	-	-	-
Number of Constraints	0	3	2	3	1	1	2	3

Of the alternatives determined to be feasible as points for interconnection, four of the potential sites were eliminated in Phase 2 screening for one or a combination of the following reasons:

1. Presence of rivers, streams, or other waterbodies, or wetlands,
2. Floodplains or flood zones,
3. Forested areas,
4. Dense residential population nearby,
5. State trunk highway adjacent to the potential substation location, and/or
6. Load flow analysis indicating that significant electrical network upgrades would be required.

While the Jefferson site was the leading site after the Phase 2 screening, the four most feasible sites were carried forward for the Phase 3 evaluation which is described below and summarized in Section 2.2.

Reasons for elimination of potential sites in Phase 2 are summarized below:

- Greenleaf 138 kV was eliminated because the presence of a floodplain, flood zone, wetlands, woodlands and waterways, and presence of a state trunk highway adjacent to the existing substation constrained acreage available for development.
- London 138 kV was eliminated because the presence of floodplain, wetlands, woodlands, rivers and waterways, and the Village of Deerfield in proximity to the existing substation constrained acreage available for development.
- North Monroe 138 kV was eliminated because significant electrical network upgrades would be required to accommodate the Proposed Action.
- Oak Ridge 138 kV was eliminated because the existing substation is near dense residential populations associated with the Cities of Verona to the west and Fitchburg to the north and east.

Four sites (Jefferson 138 kV, Cambridge 138 kV, Rockland 138 kV, and Root River 138 kV) were evaluated in the Phase 3 site selection analysis. Three of these sites were eliminated for the following reasons:

- Cambridge 138 kV was eliminated because the presence of floodplain, rivers and streams, waterbodies, wetlands, and woodlands near the existing substation, and a dense residential population associated with the Village of Cambridge within 1 mile of the existing substation.
- Rockland 138 kV was eliminated because floodplains, wetlands, waterways, and near the City of De Pere limited available acreage for development.
- Root River 138 kV was eliminated because floodplain, rivers and streams, waterbodies, wetlands woodlands, and near the City of Franklin population to the existing substation limited available acreage for development.

The Phase 3 analysis indicated that Jefferson 138 kV, the Project site in Jefferson County, was the preferred development site for the following reasons:

1. Low density of residences and development,
2. Adequate acreage available for site development outside of wetlands and floodplains,
3. Available substation adequate to accommodate 149 MW,
4. Suitable regional solar source, and
5. Proximity to major load centers.

2.1.4 Previous Studies

Badger State Solar completed a Site Selection Study in February 2021 and an Alternatives Evaluation Study in June 2021. The Site Selection Study is included in Appendix D and the results of the Site Selection Study are summarized in Section 2.1. The Alternatives Evaluation Study is included in Appendix E and the results of the Alternatives Evaluation Study are summarized in Sections 2.2 and 2.3.

In addition to the studies described herein, Badger State Solar also completed the following studies/reports:

- Preliminary Geotechnical Report (Appendix F),
- Horizontal Directional Drilling Inadvertent Release Control and Mitigation Plan (Appendix G)
- Pre-Construction Sound Report (Appendix H),
- Wetland Delineation Report (Appendix I),
- Glare Hazard Analysis (Appendix J),
- Cultural and Historic Resource Reports (Appendix K), and
- Economic Impact Report (Appendix L).

2.2 Alternatives Considered but Not Studied in Detail

Alternative energy sources and potential site locations were considered. Dairyland Power's portfolio of alternative energy sources was considered as part of the alternative selection process. The proposed solar option was selected as the best energy technology option, and the most reasonable energy source alternative to meet Dairyland's power capacity needs and renewable energy goals. Therefore, the solar energy alternative was the only energy alternative carried forward for detailed analysis.

Eighteen potential site location alternatives for the proposed solar facility were considered using the alternative evaluation process and selection criteria described in Section 2.1.3. Eight site alternatives determined to be feasible as points for interconnection were evaluated in the Phase 2 screening analysis. The Phase 3 site selection evaluation involved detailed analysis of the four most feasible sites from

Phase 2 as summarized in Table 2.2-1 below. Lower site rank scores represent a more favorable evaluation for a given category and for the project overall. Where given categories were essentially identical among sites, they were given the same numerical rank score.

Table 2.2-1. Screening Results for the Four Most Feasible Sites

Evaluation Criteria	Substations			
	Jefferson 138 kV	**Cambridge 138 kV**	**Rockland 138 kV**	**Root River 138 kV**
	Site Characteristics [Site Ranking]			
Total Land (acres)	1,203.00 [1.5]	1,199.00 [1.5]	1,325.00 [3]	1,518.00 [4]
Buildable Land (acres)	811.5 (67%) [1]	707 (59%) [2]	702 (53%) [3]	364 (24%) [4]
Parcel Availability [if leased]	65 [0]	58 [0]	50 [0]	64 [0]
Distance to Interconnect (miles)	0 [2.5]	0 [2.5]	0 [2.5]	0 [2.5]
Habitable Residences	39 [2]	20 [1]	44 [3]	67 [4]
Forested Area (acres)	31.4 [1]	100 [2]	213 [3]	530 [4]
Topography >5% Slope (acres)	163.21 [1]	242 [2]	575 [4]	312 [3]
Hydric Soil (acres)	530 [3]	504 [2]	346 [1]	1344 [4]
Waterways (miles)	6.12[a] [3]	5.00[b] [2]	4.57[b] [1]	9.23[b] [4]
Wetlands (acres)	32.5[a] [1]	158[b] [3]	62.4[b] [2]	444[b] [4]
Floodplain (acres)	0 [1]	31.16 [2]	46.92 [3]	204.69 [4]
Floodway[c] (acres)	0 [-]	93.14 [-]	126.50 [-]	393.68 [-]
Farmland[d] (acres)	916 [1]	1,008 [2]	1,057 [3]	1,311 [4]
0.5-Mile Radius Visual Zone From Roads (miles)	17.25 [1.5]	19.3 [3]	24.3 [4]	17.5 [1.5]
Total Site Rank Score	**[19.5]**	**[25.0]**	**[32.5]**	**[43.0]**

[a] Field survey
[b] Desktop survey based on Wisconsin Wetland Inventory
[c] Not ranked
[d] Prime farmland and farmland of statewide importance, prime farmland if drained.

Based on the Phase 3 detailed analysis, and evaluation of the existing transmission grid in Wisconsin, land suitability for development of the solar facility, landowner acceptance, and responsiveness of the community, the Jefferson site in Jefferson County best met the site selection criteria and was determined to be the most reasonable site location alternative for solar facility development. This site location alternative was the only siting alternative carried forward for detailed field analysis as the Proposed Action.

The Jefferson County site initially included three proposed development areas. The proposed Primary Solar Array Development Area (Primary Area) located on approximately 1,200 acres on the north and south sides of US 18, approximately 2-miles west of the City of Jefferson (see Figure 1.1-2). A majority of the Primary Area would be located west of State Highway 89. The proposed collector substation would be located within the proposed Primary Area. The Alternate Solar Array Development Area (Alternate Area) included an additional 335 acres south of US 18 and north of County

Trunk Highway J to allow flexibility in the solar array layout design based on site-specific conditions encountered during detailed design and construction. An Optional Solar Array Development Area (Optional Area) required by the PSCW consisted of an additional 211-acres north of County Trunk Highway J. Badger State Solar considered all three of these development areas in their CPCN Application to the PSCW.

As the solar facility design progressed, Badger State Solar determined that the approximately 1,200-acre Primary Area (Jefferson, the Badger State Primary Area) would be suitable to host the proposed 149 MW solar power facility without requiring development of the Alternate and Optional Areas. The Primary Area became the Proposed Action which is the focus of this EIS. The Alternate and Optional Areas were eliminated from consideration for the Proposed Action. The combined approximately 500-acre Alternate and Optional Areas are currently being planned for development as the separate Crawfish River Solar Project. The Crawfish River Project is not associated with the Proposed Action, however, potential cumulative impacts associated with the development of this Proposed Action will be addressed in this EIS.

2.3 Description of Alternatives

The Proposed Action was considered by Badger State Solar to represent the best option for reasonably and economically meeting the purpose and need for the Project, which is to offset the loss of generated power from coal-fired power plant closures with renewable solar power generated power that would contribute to Dairyland Power's Sustainable Generation Plan goals of reducing carbon dioxide intensity rate and increasing renewable power generation (DPC 2021).

Alternative energy technologies, other than solar power, were not considered to be reasonable alternatives for meeting the purpose and need for the Project.

2.3.1 No Action

Under the No Action Alternative, RUS would not fund the Proposed Action. The No Action Alternative would not meet the goals of a replacement power generation source to meet local demand or contribute to Dairyland Power's 2030 Sustainable Generation Plan goals.

Badger State Solar would not develop the solar facility and would not interconnect at the ATC-owned Jefferson 138kV substation (Stantec 2021a).

2.3.2 Reasonable Alternatives Considered

The four most reasonable alternatives that were considered in detail in Phase 3 are described in Section 2.2. The Proposed Action Alternative considered in the detailed analysis in this EIS was determined to best meet siting requirements and Dairyland Power's energy needs, and is the is the only reasonable alternative that meets the project purpose and need.

2.4 Agency-Preferred Alternative

RUS considers the Proposed Action to be the preferred alternative based on the outcome of the alternative evaluation process.

2.5 Mitigation Measures

This section provides a summary of the mitigation measures that Badger State Solar would employ to avoid or reduce adverse impacts from the Proposed Action.

2.5.1 Mitigation Measures from CPCN Process

- Spreading subsoil on cropland or pasture will be avoided.
- Drain tile locations in construction areas will be flagged and avoided to the extent practicable.
- Badger State Solar shall perform post-construction noise studies as described in the current version of the PSCW Noise Measurement Protocol. Within three months of the date when the authorized solar facility is operational, Badger State Solar shall repeat the noise measurements conducted as the pre-construction noise study, shall measure the maximum noise created at the solar facility with all equipment and inverters on and while the panels auto-rotate, and shall measure the noise at the site with all units off.
- Badger State Solar shall make available stray voltage testing for all agricultural confined animal operations within one-half mile of the solar farm.
- To reduce the potential for impacts to northern long-eared and other bat species as well as nesting birds, it would be beneficial for the approximately two acres or less of tree clearing to occur outside of the summer avoidance period of June 1 through August 15.
- Badger State Solar shall work with PSCW and WDNR staff on developing a vegetation management plan that minimizes impacts to ground nesting birds and creates an environmentally sustainable ground cover on the solar array sites. The plan shall be provided to PSCW and WDNR staff at least 30-days prior to the pre-construction meeting.
- Badger State Solar shall develop and implement a training, response, and reporting system for any incidental wildlife observations and provide an annual report of any incidents recorded by the system to PSCW and WDNR staff.
- Badger State Solar shall meet with PSCW and WDNR staff once project designs and construction plans are complete and prior to construction in order to review planned actions and ensure their compliance with permit and order conditions.
- When unexpected situations may be discovered in the field, Badger State Solar shall consult with PSCW staff familiar with the Proposed Action to determine

whether the change rises to the level where PSCW review and approval is appropriate.

- Badger State Solar will develop a Spill, Prevention, Countermeasures, and Control (SPCC) Plan all of its contractors will be required to comply with the plan. At a minimum the SPCC Plan will identify mitigation methods to be employed, should a spill occur.
- Larger wetland communities and nearby waterways will be flagged and avoided to the extent practicable. Best management practices (BMPs) such as erosion control methods and use of construction matting will be employed to protect wetlands and waterways in and/or near the construction areas.
- Essentially all of the collection system will be installed utilizing trenching methods (with the exception of the overhead connection lines over US 18). Where these facilities must cross waterways, impacts will be avoided by using underground horizontal directional drilling (HDD).
- Once the panels and associated facilities have been installed, the surrounding area will be seeded with an appropriate herbaceous seed mix for perennial grasses. A native prairie grasses, sedges, and forbs mix may be used in open spaces between panel blocks and areas between the perimeter fence and property boundaries.
- Perimeter fencing will provide for the passage of smaller wildlife such as possum, raccoon, and rabbit while keeping larger mammals such as whitetail deer excluded.
- Panel arrays will be designed and constructed to conform to the existing topography to avoid the need for significant grading. Access roads will be constructed as close to existing grade as possible; maintaining preconstruction hydrologic flow patterns
- If glint or glare prove to be problematic for an observer, Badger State Solar would apply mitigation actions such as screening vegetation, fencing, or other ways of visual screening between the areas of glare and viewers.
- Badger State Solar would evaluate each possible route for suitability and potential mitigation needs prior to construction.
- A minimum 10-foot (3-meter) buffer will be maintained between the Proposed Action ground disturbing activities and the boundary of the cemetery.
- Badger State Solar shall mitigate impacts to line-of-sight communications and landowners that can show disruption to broadcast communications post construction.

2.5.2 Mitigation Recommendations from the U.S. Fish and Wildlife Service

- Identify bald eagle nests that are within or near the Project site to inform project layout. If the may impact a bald eagle nest, or unavoidably disturb bald eagles, contact the USFWS regarding the Eagle Act permit process.
- Select a site with the least wildlife value practicable. If low wildlife sites are not feasible, avoid or minimize to the greatest degree practicable the conversion of forest areas, native grasslands, and wetlands.
- Help to ensure that bat habitat is adequately protected by minimizing the removal of forested habitat and protecting forested hedgerows or other forested corridors connecting areas of suitable bat habitat.
- For federally listed species, plan to avoid impacts to suitable habitat. If habitat impacts cannot be avoided, conduct appropriate surveys to confirm species presence.
- Plan the site to provide habitat for pollinators, including a water source (e.g. ephemeral pool or low area to provide additional resources for pollinators and bats.
- When removing wildlife habitat, avoid spring and summer (March 15-August 15 when feasible).
- Consider voluntary mitigation to offset the loss of forested areas, wetlands, or native grasslands.
- Use construction techniques and materials (wildlife friendly erosion control materials) that are unlikely to cause additional harm to wildlife.
- Implement measures to reduce the chances that equipment will exacerbate the spread of invasive species into natural habitats (e.g., cleaning equipment prior to accessing the site, post-site restoration monitoring, and invasive plant treatments, as necessary).

2.6 Comparison of Alternatives

The Proposed Action and No Action Alternatives were the only alternatives carried forward for detailed analysis. The Proposed Action would best meet the purpose and need for the Project since it would meet Dairyland Power's capacity needs and renewable energy goals. The No Action Alternative would not satisfy Dairyland's capacity need or contribute to achieving Dairyland Power's renewable energy goals because the proposed solar facility would not be developed. Detailed impact analysis of the alternatives is shown in Table 2.6-1.

Table 2.6-1. Comparison of Alternatives

Environmental Resource		No Action	Proposed Action		
			Construction	Operation	Decommission
Soils and Geology	Soils	Minor, direct, long-term	Minor, direct, short-term	Minor, direct, long-term	Minor, direct, short-term
	Geology	No impact	Minor, direct, short -term	No impact	No impact
Groundwater		Minor, indirect, long-term	Negligible	Minor, direct, long-term, and potentially indirect beneficial	Negligible
Surface Water		Minor, direct, long-term	Minor, direct, short-term	Minor, direct, short-term, and potentially indirect beneficial	Minor, direct, short-term
Air Quality		No impact	Minor, direct, short-term	Minor, direct, long-term, and beneficial	Minor, direct, short-term
Acoustic Environment		No impact	Minor, direct, short-term	Negligible	Minor, direct, short-term
Biological Resources	Vegetation	No impact	Negligible	Minor, long-term, direct, and potentially beneficial	Negligible
	Wetlands / Riparian Areas / Floodplains	No impact	Minor, direct, short-term wetlands/ riparian areas; No impact to floodplains	No impact	Minor, direct, short-term wetlands/ riparian areas; No impact to floodplains
	Wildlife	Minor, indirect, long-term	Minor, direct, short-term	Minor, direct, long-term	Minor, direct, short-term
	Aquatic Resources	Minor, direct, long-term	Minor, direct and indirect, short-term	Minor, direct and indirect, long-term, and potentially beneficial	Minor, direct and indirect, short-term
	Special Status Species	No effect	No effect to not likely to adversely affect	No effect	No effect
Land Resources		No impact	Minor, direct, long-term, adverse	Minor, direct, long-term, adverse	No impact
Visual Resources		No impact	Minor, direct, short-term	Minor, direct, long-term	Minor, direct, short-term
Transportation	Roads / Traffic	No impact	Minor, direct, short-term	Negligible	Minor, direct, short-term
	Airports	No impact	No impact	No impact	No impact
Cultural Resources		Minor, long-term	No adverse effect	No adverse effect	No adverse effect
Public Health and Safety		No impact	Minor, direct, short-term	Minor, direct, short-term	Minor, direct, short-term
Socioeconomics	Economics	No impact	Minor, direct, short-term, and beneficial	Minor, direct, long-term, and beneficial	Minor, direct, short-term, and beneficial
	Environmental Justice	No impact	No impact	No impact	No impact
Cumulative Impact		No impact	Minor, direct and indirect, short-term	Minor, direct and indirect, long-term	Minor, direct and indirect, short-term

3.0 AFFECTED ENVIRONMENT AND EFFECTS OF ALTERNATIVES

The affected environment is discussed for the Proposed Action, shown on Figure 2.1-1 and referred to as the Project site. Environmental consequences address the disturbance area within the Project's property boundary and potential impacts on the immediately adjacent area.

Potential effects were evaluated based on the following characteristics and determined on a case-by-case basis for each environmental resource:

***Short-term or long-term*.** These characteristics do not refer to any rigid time period. Short-term impacts would be those that are temporary and short-lived. Long-term impacts would be those that would be more likely to be persistent and chronic.

***Direct or indirect*.** A direct impact would be caused by and occur contemporaneously at or near the location of the action. An indirect impact would be caused by a proposed action and might occur later in time or be farther removed in distance but could still be a reasonably foreseeable outcome of the action.

***Negligible, minor, moderate, or major*.** These relative terms are used to characterize the magnitude or intensity of an impact. Negligible impacts would generally be perceptible but would be at the lower level of detection. A minor impact would be slight, but detectable. A moderate impact would be readily apparent, but less than significant. A major impact would be significant.

***Significant or beneficial*.** A significant impact would be one having unfavorable or undesirable outcomes on the man-made or natural environment. A beneficial impact would be one having positive outcomes on the man-made or natural environment. A single act might result in significant impacts on one environmental resource and beneficial impacts on another resource.

3.1 Soils and Geology

3.1.1 Affected Environment – Soils and Geology

3.1.1.1 Soils

Basic landforms within Jefferson County are glacially derived with soil types strongly influenced by historic glacial periods (USDA 1979). The northern third of the county is dominated by drumlin fields. Drumlins are oval shaped hills of till. There are normally low concave depressions between the drumlins that are indicative of either glacial spillways or old lake terraces. There is a large outwash plain between Lake Ripley and Lake Mills (WDOT 2017) which is indicative of a glacial melt-water terrace. In the southeast corner of the county is the "Kettle Moraine". This complex topography is composed of kames and kettle holes. Based on Badger State Solar's geotechnical investigation (Appendix F), the Project site consists of mainly stratified silts and sands, with some gravels at depth (Stantec 2018). Surficial soils consisted of organic silt to a

depth ranging from 5 to 24 inches. Beneath the organic soils are organic peaty soils with lake marls extending to a depth of up to 6 feet. Gray to blue-gray or green-gray silty sand with gravel were encountered to a depth of approximately 27 feet. Cobbles of 2 to 5 inches and boulders up to 12 inches in diameter were also encountered at various depths. Soils are discussed in further detail in Section 3.6.1.2.

3.1.1.2 Geology and Seismic Characteristics

Geology

The Project site is located near the boundary of the Wisconsin Western Uplands and the Eastern Ridges and Lowlands physiographic provinces. The till plains section of the Central Lowland physiographic province of the United States encompasses these provinces. The Central Lowland physiographic province occupies the middle of the long stable North American continent. Tectonic activity has little effect on this location (USGS 2002).

The topography of the Project site is flat to gently rolling. Deposits of glacial outwash and glacial till immediately underlay the site. These unconsolidated materials rest atop a bedrock surface, described below.

Site topography at the Project site slopes gently toward the northeast in the direction of the Rock River. The change in ground surface elevation across the proposed main facility site is about 96.0 feet (29.3 meters) between the southwest and northeast portions of the site. Elevations across the entire site range from about 826 feet (251.8 meters) above mean sea level (amsl) at the south of the property to 922 feet (281.0 meters) amsl in the northeast corner.

Physical features and the surficial geology at the Project site and across the southeastern Wisconsin region are the product of successive Pleistocene glacial advances, retreats, and related depositional and erosional processes (Fullerton et al. 2003). Both the Illinoian and younger Wisconsin glaciations affected southeastern Wisconsin and Jefferson County as lobes of ice comprising the Laurentide Ice Sheet moved south and southwest out of central Canada and across the region (WGNHS 2011b).

Portions of south-central Wisconsin, including Jefferson County and the Project site, were last glaciated during the Illinoian Glaciation between 128,000 and 310,000 years ago (Fullerton et al. 2003). At its peak, ice reached into Indiana, Illinois, and Iowa and encompassed much of northern and eastern Wisconsin. The Johnstown end moraine, which is located to the south of the Project site, marks its terminus. When this glaciation ended 11,000 years ago, the ice sheet retreated north (Fullerton et al. 2003, WGNHS 2011b, Peterson 1986).

These glacial movements deposited glacial till, basal moraine, and end moraines. Till is a mixture of materials—clay, silt, sand, granules, pebbles, cobbles, and boulders—

directly deposited by glacial ice. Ground moraine is a sheet or layer of till that often forms a gently rolling plain of low relief. End moraine, a thickened layer of till deposited at the margin of glacial ice, characteristically exists as belts or concentric or overlapping ridges of till (Fullerton et al. 2003). Glacial streams flowing from the edges of the ice deposited sand and gravel outwash. Alluvial processes, including flowing water, wind, and erosion, have subsequently reworked the deposited materials (WGNHS 2011a).

The surficial geology of Jefferson County consists of Wisconsin-age tills and moraines. These moraines formed at the margins of the Green Bay ice lobe. The remainder of the county contains Illinoian-age ground moraine deposits that southward-flowing glacial outwash stream deposits and lake deposits have dissected in places. The stream valleys now contain late Wisconsin-age and possibly Holocene-age glacio-fluvial outwash deposits (Fullerton et al. 2003). The surficial geologic unit at the Project site is glaciofluvial outwash composed of sand and gravel (Stantec 2018).

Beneath the Pleistocene- and Holocene-age sediments, the uppermost bedrock unit is the Platteville–Galena Formation of Ordovician age, which comprises limestone and dolomite. In descending order, sandstones of the St. Peter Formation and the carbonates of the Prairie du Chien Group, where present, underlay the Platteville–Galena Formation. These eroded units rest upon a thick sequence of Cambrian-age sedimentary rock that consists primarily of sandstone in the upper part. These Cambrian-age rocks are up to 1,000-foot (300-meter) thick and extend to Precambrian-age basement rock (WGNHS 2011a).

Sedimentary bedrock underlying the Project site formed from materials deposited in a shallow marine environment over millions of years in a structural feature known as the Michigan Basin. The site lies on the western margin of the Michigan Basin and on the southeastern edge of the Wisconsin Arch. The Wisconsin Arch and the Kankakee Arch to the south of the site are northwest- to southeast-striking tectonic features believed to be related to crustal adjustment during and following the development and filling of the Michigan Basin more than 300 million years ago. This deformation led to the regional faulting and folding of subsurface strata in some areas. Despite this activity, the orientation of sedimentary strata site indicates little subsequent deformation (Crone and Wheeler 2000).

Nevertheless, several geologic faults mapped regionally in association with the Wisconsin and Kankakee Arches are located as close as 2 miles (3 kilometers [km]) to the site. One of the most prominent faults is the Waukesha fault located about 20 miles (32 km) to the west and southwest of the site. This northeast-striking fault runs for up to 133 miles (214 km) in the subsurface. Closer to the site, the Janesville fault (or the Evansville fault) is located about 6 miles (10 km) north of the City of Janesville. This 19-mile-long (31-km-long) east-striking fault exhibits an estimated 70 feet (21 meters) of displacement. A smaller unnamed fault of similarly oriented been traced for about 1.6 miles (2.6 km). It is located less than 2 miles (3 km) north of the City of Janesville (Crone and Wheeler 2000).

None of these faults are expressed at the surface, and no reported evidence exists of Pleistocene or post-Pleistocene activity on any regional faults (USGS 2012). However, liquefaction features in the Wabash Valley in southern Indiana and Illinois indicate the presence of active faulting in the Holocene and late Pleistocene period (Crone and Wheeler 2000).

Seismic Characteristics

Southeastern Wisconsin lies within the central portion of the North American craton (stable interior portion of the North American continent). Historically, the seismicity of the region encompassing the Project site is characterized by relatively infrequent small to moderate earthquakes typical of much of the central and eastern United States (USGS 2018). Across the stable continental region of the United States, the period for noticeable earthquakes would be in the range of years.

In the central and eastern United States, earthquakes can be felt over a very wide area. For example, a magnitude 4.0 earthquake can be felt at locations as far as 60 miles (100 km) from its source, and the earthquake can occasionally cause damage near its source. A magnitude 5.5 earthquake can be felt as far as 300 miles (500 km) from its source, and the earthquake often causes damage near its epicenter and sometimes as far away as 25 miles (40 km) (USGS 2021).

The US Geological Survey's (USGS's) seismic hazard estimates indicate the Project site is located within one of the lower earthquake hazard areas in the conterminous United States. Earthquake sources in Southern Illinois are the primary drivers of seismic hazard in the region (Petersen et al. 2011).

There have been six earthquakes since 1973 within a radius of 200 miles (322 km) of the Project site with a magnitude equal to, or greater than, 2.5. Two of these events occurred in 2013 and one in 2012 at magnitudes of 3.2, 2.6, and 3.0, respectively. The closest earthquake was a magnitude 2.6 earthquake in June 2013, with its epicenter near the City of Campton Hills, Illinois (USGS 2021). The largest earthquake was a magnitude 4.2 event in June 2004, centered near the City of Ottawa, Illinois (USGS 2021). This earthquake was widely felt across northern Illinois, southern Wisconsin, and western Indiana. Across southeast Wisconsin, it produced shaking in the range of II to III on the Modified Mercalli Intensity (MMI) scale, but no serious damage was reported (USGS 2021). Although shaking can be felt in this range, this level is unlikely to produce any damage to structures (USGS 2021).

Historically, larger earthquakes have occurred in adjoining regions with effects felt across southern Wisconsin. The largest of these earthquakes occurred on May 26, 1909, with an estimated magnitude of 5.1. The epicenter of this earthquake was near Aurora, Illinois. The earthquake produced MMI VII shaking at its epicenter with many reports of fallen and damaged chimneys. This event is estimated to have produced MMI

V shaking across the area of the Project site. MMI V shaking can overturn objects and cause minor damage to personal property.

3.1.2 Environmental Consequences – Soils and Geology

3.1.2.1 No Action Alternative

Under the No Action Alternative, RUS would not fund the Proposed Action. Existing land use would remain as primarily farmland with some undeveloped areas. Over time, with continued agricultural use, soils could erode and soil nutrients could be depleted resulting in minor impacts. Other indirect impacts to soils and geology could occur if the current land use practices are abandoned and the site were developed.

3.1.2.2 Proposed Action

The Proposed Action would disturb approximately 1,200 acres in Jefferson County, Wisconsin. This relatively level land is primarily under crop production with trees in a few areas and along fence lines. Minimal grading is anticipated with only about 2.5 acres of vegetation clearing and grubbing, and not more than 2 acres of tree clearing is expected. Panel arrays would be designed and constructed to conform to the existing topography to avoid the need for significant grading. Access roads would be constructed as close to existing grade as possible; maintaining preconstruction hydrologic flow patterns. The existing soil surface would remain intact over the majority of the site with disturbance over 30 percent of the acreage. Soils would remain in place except where trenches or foundations are constructed. Topsoil would be removed and maintained for reclamation during decommissioning activities in 25 to 40 years. Spreading soils on cropland or pasture would be avoided. BMPs such as silt fences, soil stabilization, construction matting, and other sediment control measures would be employed to minimize soil erosion and to facilitate sediment control. Soils would remain undisturbed within buffer zones for sensitive biological and cultural resources.

Twelve to 15 miles of internal existing roads would be used for access along with geotextile matts topped with aggregate as needed to protect the native subsoil. Panels would be installed using 63,306 foundation piles installed 6 to 10 feet deep. Underground collector circuits would be installed in 1-foot wide trenches located more than 36 inches deep using 10.5 miles of trenching and 0.4 miles of directional boring. There would be an overhead crossing for collector lines spanning a distance spanning 375 feet to avoid boring under US 18. The overhead span would be 17 feet above the roadway supported by 2 to four poles with a minimum of 15 lines. A 280-foot by 195-foot substation along with an operations and maintenance building complete with septic system would also be built. Impacts to geologic resources would be minor and permanent with the placement of the foundation piles. Impacts to soils would be minor, temporary, and minimized using BMPs.

The Proposed Action would result in a minimal increase in impervious surfaces. The use of existing roadways along with pervious geotextile matts and aggregate would do

little to impede percolation into the soil. And the relatively small footprint of the panel foundation posts is a minute portion of the larger Project area. Runoff from the panels would infiltrate into the planted and maintained perennials over the approximately 1,200-acre site.

A Storm Water Pollution Prevention Plan (SWPPP) would be developed for disturbance over this approximately 1,200-acre site as part of the required National Pollutant Discharge Elimination System (NPDES) Permit for stormwater discharges associated with construction. The site-specific SWPPP would document the Project and the measures employed to prevent and minimize pollutants from reaching stormwater runoff. Measures would include BMPs utilized during construction, site development, operations, and decommissioning to control runoff and sediment. BMPs would include measures to slow runoff and increase infiltration; thereby decreasing erosion and sediment transport. Therefore, overall, impacts to soils as a result of construction would be minor.

Soil disturbance during operations would be minimal with a perennial cover maintained at less than 2 feet in height and module washing would be limited to two events per year. The perennial cover maintenance may also employ selective herbicides to control weeds and noncompliant volunteer foliage. Overall, no adverse impacts to soils are anticipated from Project operations.

Soil impacts at the decommissioning of the Project in 25 to 40 years are anticipated to be similar to construction impacts. Previously removed topsoil would be reclaimed and the site would be returned to its previous agricultural usage. Adverse impacts to soil would be minor.

3.2 Water Resources

3.2.1 Groundwater

3.2.1.1 Affected Environment – Groundwater

Groundwater beneath the Project site occurs in unconsolidated and consolidated water-bearing deposits (aquifers). The USGS has broadly classified and grouped the distinct geologic units comprising these aquifers into the surficial aquifer system and the Cambrian-Ordovician aquifer system (Olcott 1992). Neither of these systems contains sole-source aquifers.

The surficial aquifer system is the most widespread system across Wisconsin and bordering States. Across Jefferson County, it predominantly comprises Pleistocene-age glacial sediments and younger alluvial sediments that lie atop the bedrock surface (Olcott 1992). At the Project site, the local surficial aquifer comprises glacial outwash, a mixture of poorly graded sand and of sand and gravel (Stantec 2018, Zaporozec 1982). Groundwater was encountered at depths ranging from 3 feet (0.91 meters) to 21 feet (6.4 meters) in the test borings. The surficial aquifer is recharged locally from

precipitation, with groundwater generally moving downgradient to discharge points (Olcott 1992).

Beneath Jefferson County, the Platteville-Galena Formations (dolomite), St. Peter Formation (sandstone), Prairie du Chien Group dolomites, and deeper Cambrian sandstone formations represent the Cambrian–Ordovician aquifer system. These units may act as a single aquifer or as independent aquifers, based on the separation of the units by less permeable members (Olcott 1992).

Although the rocks of the Platteville–Galena are considered confining units, particularly where they are overlain by younger sedimentary rocks, they represent a local aquifer in outcrop areas across Wisconsin suitable for domestic water supply (Olcott 1992). Similarly, the rocks of the St. Peter Formation and Prairie du Chien Group comprise the St. Peter–Prairie du Chien–Jordan Aquifer. In general, recharge to these aquifer strata occurs where the strata outcrop at the surface and from the overlying glacial sediments (Olcott 1992).

In most areas, the confining units of this aquifer system are leaky and allow vertical downward movement of groundwater within the system (Olcott 1992). On a regional basis, the direction of groundwater flow in the uppermost portion of the Cambrian–Ordovician aquifer system is generally south to southeast toward the Illinois Basin and/or toward regional discharge areas, such as Rock River. The exception is where large pumping centers, such as those in eastern Wisconsin, affect flow (Olcott 1992).

Well yields vary considerably from the individual aquifers that comprise the Cambrian-Ordovician aquifer system, however wells completed in the sandstones can yield 1,000 gallons per minute (3.8 cubic meters per minute) or more (Olcott 1992).

3.2.1.2 Environmental Consequences – Groundwater

No Action Alternative

Under the No Action Alternative, RUS would not fund the proposed solar facility; therefore, no Project-related impacts to groundwater resources would be expected to occur. Existing land use would remain primarily farmland with tree festooned fence lines and with small, forested areas. Groundwater resources would remain as they are at the present time.

Indirect impacts to groundwater resources could result due to the continuing use of the Project site as agricultural land. There would be no conversion from row crops with regular tilling and harvest to solar farm with a maintained perennial cover; so, erosion may occur. With continued agricultural processes, fertilizers and pesticides may impact groundwater, erosion and sedimentation could also alter runoff patterns further impacting groundwater. Therefore, the No Action Alternative could result in minor, indirect, long-term impacts to groundwater.

Proposed Action

No adverse impacts to groundwater would be anticipated as a result of construction of the Proposed Action. The Proposed Action would comply with the requirements of the Clean Water Act (CWA) through preparation and implementation of a SWPPP and filing of a NOI to comply with the Construction General NPDES Permit. The Proposed Action would also request a Stormwater Runoff Permit in compliance with the Wisconsin NPDES program. The SWPPP would include BMPs to implement and maintain effective erosion and sediment controls (such measures can include but are not limited to silt fences, soil stabilization, construction matting, and other sediment control measures). Existing agricultural drainage tiles identified on the Project site would be avoided to the extent practicable and maintained and repaired or replaced as needed.

Although the elevated PV panels would be installed in parallel rows across the site, the total surface area of the panels would cover less than 1,200 acres. The impacts to groundwater infiltration and surface water runoff would be minimal. Rainwater would run off the panels through the maintained perennial cover and infiltrate into the soil. While hazardous materials would not be used or stored onsite, petroleum fuels, lubricants, and hydraulic fluids used during construction and by maintenance vehicles may spill. The use of BMPs (including but not limited to measures such as ensuring vehicles are regularly inspected and maintained and only performing necessary vehicle maintenance when onsite in designated areas) to properly maintain vehicles to avoid leaks and spills along with procedures to promptly address spills, would minimize the potential for adverse impacts to groundwater.

A well would be drilled onsite within the Project area to supply water for construction and for normal operations of the Proposed Action. Construction of the Proposed Action would require approximately 15 acre-feet of water. Water for use during normal operations would be dominated by washing of the solar panels. Because normal rainfall is anticipated to regularly wash the dust from the PV panels, the Proposed Action is anticipated to require washing twice yearly at the most. Operational water needs are anticipated to be only 0.25 acre-feet per year. Therefore, impacts to groundwater from construction and operation of the Proposed Action are anticipated to be minor, direct, and long-term.

The Proposed Action may provide beneficial indirect impacts to groundwater through less erosional products, pesticides, and herbicides entering the groundwater. Changing the primary land use from agricultural to the maintained perennial ground cover of the Proposed Action could eliminate the source of these potentially damaging impacts and result in a minor, beneficial indirect impact to groundwater.

3.2.2 Surface Water

3.2.2.1 Affected Environment – Surface Water

This area of south-central Wisconsin is part of the southeast glacial plains landscape, deposited during the last ice age. There are a number of small lakes as well as numerous small rivers in the area. Crawfish River runs roughly north to south and is a tributary to Rock River. The lower Crawfish River has a 720 square miles (mi^2) watershed, with approximately 70 percent of the land in agriculture. The Rock River is a non-navigable stream which originates north of Horicon Marsh near Brandon, Wisconsin and flows to the Mississippi River at Rock Island, Illinois. The river is approximately 300-miles long (480 km) and drains an area of 10,880 mi^2 (28,180 square km) (Britannica 2021). The Rock River is located in HUC 07090001, while Crawfish River is located in HUC 07090002 (USGS 2020). The confluence of Crawfish and Rock Rivers is approximately 2 miles east of the Project site in the City of Jefferson.

Rock lake is located about 5 miles north-northwest of the Project site. It is a 1,365-acre lake in Jefferson County with an average water depth of 16 feet (WDNR n.d.-c). Lake Koshkonong is located 5 miles south-southwest of the Project site. It is a 10,595-acre lake located in Dane, Rock and Jefferson Counties with a mean water depth of 5 feet (WDNR n.d.-a). Lake Mendota is 9,781 acres and is located in Dane County, and the average water depth is 42 feet (WDNR n.d.-b). This lake is located 26 miles west-northwest of the Project site.

Lake Michigan is located approximately 50 miles east of the site and is bordered by Indiana, Michigan, Illinois, and Wisconsin. It is the third largest of the Great Lakes by surface area at 22,300 mi^2 (57,800 square km) and second largest by volume at 1,180 cubic miles (4,920 cubic km). It has an average depth of 279 feet (85 meters) and a maximum depth of 925 feet (282 meters) (Zimmerman 2017).

303(d) Impaired Waters

There are no impaired waters located on the Project site. The closest impaired waters are the Crawfish River and Rock River both located approximately 2 miles from the Project site. The main impairments in the area are due to total phosphorus and total suspended solids, from both point and nonpoint sources (WDNR 2020c). Table 3.2-1 lists all 303(d) impaired waters within 5 miles of the site.

Table 3.2-1. Wisconsin 303(d) Impaired Waters List Near the Project Site with Reasons for Impairment

Impaired Water	Waters ID	County	Area of Impairment	Reason for Impairment	Impairment
Rock River	11455, 354476, 354592, 356113, 356190, 356250, 356322, 354542, 11455, 354476,	Dodge, Jefferson, and Rock	Mile 171-298	Total Phosphorus	Degraded habitat and low dissolved oxygen

Impaired Water	Waters ID	County	Area of Impairment	Reason for Impairment	Impairment
	354592, 356190, 356250, 356322, 354542				
Crawfish River	11438, 5513911, 11438	Dodge, Jefferson, and Columbia	Mile 0-11 Mile 49-79	Total phosphorus and Total suspended solids	High phosphorus and degraded habitat
Johnson Creek	11449	Jefferson	Mile 0-18	Total phosphorus and Total suspended solids	Degraded habitat
Bark River	5541890	Jefferson	Mile 0-12	Total phosphorus	Degraded biological community
Lake Koshkonong	11710	Dane, Jefferson, and Rock	N/A	Total phosphorus, Total suspended solids	Low dissolved oxygen, eutrophicatio n, degraded habitat, turbidity
Koshkonong Creek	304950, 304937	Dane and Jefferson	Mile 0-48	Total phosphorus	High phosphorus levels, degraded biological communities

3.2.2.2 Environmental Consequences – Surface Water

No Action Alternative

Under the No Action Alternative, RUS would not fund the proposed solar facility. No Project-related impacts to water resources would be expected to occur. Existing land use would remain a mix of farmland with small pockets of forest, and water resources would remain as they are at the present time. Wetlands and other surface waters would remain as they currently are, typically degraded due to agriculture. Water quality may degrade further due to runoff from agricultural activity in the area of the Proposed Action.

Indirect impacts to water resources would continue from the use of the Project site as agricultural land. There would be no conversion from row crops to solar farm; therefore, the runoff curve number would remain at 85, indicating a high potential for erosion. Erosion and sedimentation on the Project site could alter runoff patterns and impact downstream surface water quality. In addition, if chemical fertilizers and pesticides are continually used, impacts to surface water and groundwater may occur if the local

aquifers are recharged from surface water runoff. Therefore, the No Action Alternative may result in minor, direct and indirect, long-term impacts to surface water.

Proposed Action Alternative

Construction activities at the Project site have the potential to cause direct and indirect impacts to surface water. The Proposed Action would require relatively minor grading due to the relatively flat topography. Approximately 2.5 acres of clearing and grubbing is anticipated (slope gradients of less than 2 percent) for construction purposes. During construction, runoff from disturbed areas could contain sediment and pollutants. This runoff may be washed into adjacent waters during rainstorm events, negatively impacting surface water quality at the Project site and immediately downstream. Construction of culverts and near waterways could result in an increase in turbidity and localized sedimentation of the stream bottom. Badger State Solar would obtain a construction and Wisconsin Pollutant Discharge Elimination System (WPDES) stormwater runoff permit and develop and employ BMPs such as silt fences, soil stabilization, construction matting, and other sediment control measures to minimize runoff and impacts to surface water. Badger State Solar would comply with WDNR WPDES requirements. BMPs would be first implemented prior to commencement of construction until vegetation can be reestablished in the area. Construction related impacts would be temporary, occurring only during the construction (or later decommissioning process), and through use of BMPs and adherence to permit requirements, would be expected to be minor, direct, and short-term.

Impacts to surface water at the Project site could also include local decreases in water quality and increases in sediment transport due to placing of culverts, gravel and soil within existing ditches/streams. These impacts would be minor and persist only during culvert installation. Use of BMPs in accordance with permit requirements would minimize the potential for direct impacts in association with the installation of culverts or other stream crossing measures. Directional boring would have minimal impact on surface water quality although it is possible for drilling mud/fluid to be inadvertently released during drilling. Potential adverse effects from an inadvertent release are discussed in Section 3.5.4. An inadvertent release of drilling mud/fluid would require site cleanup in accordance with the Project HDD Inadvertent Release Control and Mitigation Plan (Appendix G).

Short-term, minor surface water quality impacts may occur during the construction and operation of the Project from minimal amounts of hazardous waste generated by the Project. These may include solvents, lubricating oils, and paints. There would be minimal potential for water contamination in the event of an accidental release. Impacts to water quality from construction would be temporary and would not significantly alter long-term water quality conditions. Hazardous waste generated by the Project would be collected and disposed of in an appropriate location in accordance with an approved SPCC Plan. Therefore, potential impacts to surface water in association with leaks and spills would be minor and short-term.

There is the potential for surface water quality to improve over the lifetime of the Project due to land use change from agriculture to solar with perennial grass. This is due to the decrease in herbicides, pesticides and fertilizers applied to agricultural production areas which could then wash off into surface waters. Reductions in applied chemicals would benefit surface waters. In addition, sediment runoff would be reduced due to soil stabilization through perennial grass establishment.

A change in land use from agriculture to PV would lead to a large decrease in water use. In general, non-thermal renewables, such as PV solar sites and wind, have the lowest water consumption factors of energy production facilities (Macknick et al. 2011). Water needs for the Project site would be met using a well drilled onsite as discussed in Section 3.2.1.2. The Proposed Action would require a maximum of 15 acre-feet of water for construction and 0.25 gallons per event for panel washing, which is estimated to be required at most two times a year. Water use during construction and decommissioning would be primarily for washing equipment and dust suppression; portable chemical toilets would be used for sanitation. Badger State Solar estimates using approximately 150,000 gallons of water per year for solar panel washing.

The change in land use could result in changes to downstream water quality during operation. As discussed in Section 3.1.2, the potential for erosion and/or scour at the dripline can impact downstream water quality. Without adequate ground cover, heavy rainfall may result in sheet flow erosion as large quantities of water rush off of the solar panels during heavy storm events. However, there would likely be a reduction in the overall runoff for the Project area from the change in land use from agricultural to solar farm due to the establishment of permanent grass on the site.

The stormwater run-off curve number for the proposed grassed surface will be lower than the run-off curve number of the farm-field which it replaces for all of the Project site, except for the sub-catchment containing the sub-station. This means that the peak-discharge rates would be decreased. Conversion to impervious surface would occur on the 1.30-acre footprint for concrete pads to install the main transformer and substation. For the sub-catchment containing the sub-station, a small detention pond would be installed to reduce the peak run-off rate and reduce the total suspended solids to conform to code requirements.

BMPs would be designed, installed and maintained to infiltrate runoff to the maximum extent practicable, except where the least permeable soil horizon to 5 feet below the proposed bottom of the infiltration system using the USDA method of soils analysis is one of the following: sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, or clay.

After construction is completed, soil stabilization and vegetation management measures would reduce the potential for erosion impacts during operation. Establishment of permanent vegetation would likely further reduce any dust and sediment loss compared to tilling and other operations used in the existing agricultural practices. No permanent

stormwater measures such as detention basins or infiltration swales would be required. Vegetation in the Project site would be actively maintained throughout the operational period, to control growth and prevent overshadowing or shading of the solar panels. In addition to mowing and trimming, pre-emergent and post-emergent herbicides may be selectively used. No herbicides would be used in buffer areas or immediately adjacent to any waterbodies. Any herbicides used would be applied in accordance with applicable Federal and state laws and regulations. It is anticipated these herbicides would be applied at lower quantities than agricultural applications. Therefore, impacts to surface waters associated with onsite herbicide use would be expected to be minor.

Onsite vegetation could be maintained via sheep grazing. Solar grazing is the practice of grazing livestock, usually sheep, on solar farms. Solar grazing reduces or eliminates the need for mowing at solar sites, reducing air emissions. Generally, solar companies contract with local sheep farmers to move the sheep onto the site in the spring, care for them through the grazing season, and move them off of the site for the winter (ASGA 2021).

Grazing has known adverse impacts to downstream water quality, although most of the research has been done with cow grazing in uncontrolled conditions. The primary concern of uncontrolled grazing is the loss of vegetative cover due to frequent grazing, trampling, or grazing the plants too close to the soil which increase the soil erosion from pastures and impact downstream surface waters with sediment, nutrients, and fecal bacteria (Osmond et al. 2007). Reducing density of animals and restricting access to streams and riparian areas has been shown to reduce impacts to downstream water quality from uncontrolled cow grazing (Osmond et al. 2007). In contrast, sheep excrete considerably less fecal matter than dairy cattle (approximately 10 percent) and have not been shown to be major risk factors for the transmission of pathogens into water (Sutherland et al. 2009). Impacts to water quality from sheep grazing would be minimized by limiting grazing seasonally and using limited animals over a large area. Further, sheep grazing would occur only within fenced areas which would avoid streams and riparian areas.

The Proposed Action has been designed to avoid or minimize impacts to wetlands, streams, and ponds. The Project site was chosen primarily because of its location already disturbed by agricultural development with limited wetlands and surface water. During the site selection and solar array layout development process, streams and wetlands were avoided as much as practicable.

Overall, impacts to surface water during operations of the Proposed Action would be anticipated to be minor, both direct and indirect, long-term and potentially beneficial.

3.3 Air Quality

Air quality is defined as the concentration of specific pollutants of concern in ambient air. Most air pollutants originate from human-made sources, including mobile sources

(e.g., cars, trucks, buses, nonroad equipment) and stationary sources (e.g., power plants). Receptors within the Project area may be sensitive to potential air quality effects because of the Proposed Action.

3.3.1 Affected Environment – Air Quality

3.3.1.1 Federal/State Regulation on Air Pollutants

As required under the Clean Air Act (CAA), the US Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for the six pollutants listed below, referred to as criteria pollutants (40 CFR Part 50):

- carbon monoxide,
- nitrogen dioxide,
- ozone,
- particulate matter with diameters up to 10 micrometers (PM_{10}) and diameters up to 2.5 micrometers ($PM_{2.5}$),
- lead, and
- sulfur dioxide.

Areas that are and have historically been in compliance with the NAAQS are designated as attainment areas. Areas that violate a Federal air quality standard are designated as nonattainment areas. Areas that have transitioned from nonattainment to attainment are designated as maintenance areas and are required to adhere to maintenance plans to ensure continued attainment.

The attainment status for areas affected by the Proposed Action on local and regional scales can be used to define the existing air quality condition in the potentially affected area. In addition to the NAAQS for criteria pollutants, national standards exist for hazardous air pollutants, which are regulated under Section 112(b) of the 1990 CAA Amendments. The *National Emission Standards for Hazardous Air Pollutants* regulate hazardous air pollutant emissions from stationary sources (40 CFR Part 61).

WDNR established an 11-step air permit process that requires all new, modified, reconstructed, relocated or replaced air pollutant sources (unless exempt) to obtain a construction permit from the WDNR.

3.3.1.2 Existing Air Quality Condition

Jefferson County, where the Proposed Action would occur, has been designated as an attainment area for all criteria pollutants and therefore the Project area is considered to have a good ambient air quality condition.

3.3.1.3 Local Meteorology

Meteorology involves the science of atmospheric properties and phenomena—science that includes the atmosphere’s physics and chemistry. Beyond weather forecasting,

meteorology is concerned with long-term trends in climate and weather, and their potential impact on human populations. An important area of meteorological research is climate change and the effects it may cause (National Geographic 2021).

To determine changes in Wisconsin temperature and precipitation, scientists from the University of Wisconsin-Madison analyzed temperature records from a statewide network compiled by the National Climatic Data Center. This dataset shows that Wisconsin has become 2 degrees Fahrenheit (°F) warmer and 4.5 inches (14 percent) wetter since the 1950s, with the greatest warming during winter and the largest precipitation increase during summer (WDNR 2020b).

Wisconsin's statewide monthly precipitation and monthly air temperature over the last 12 months (July 2020-June 2021) has generally followed the same average trend each month between 1981 and 2010 (WISC 2021).

The Proposed Action would occur in Jefferson County, which experiences extreme temperature fluctuations. Temperatures in the county are hottest during summer, particularly in July, with average peak of 83°F. The winter months lasting about three months between November and March are cold, dry and windy with an average high daily temperature below 39°F. The most rain falls occurred in June with an annual average total precipitation of 4.2 inches. Average wind speeds in the county would be more than 10.3 miles per hour as the windier part of year lasts about 8 months between October and May (https://weatherspark.com).

3.3.1.4 Global Climate Change

Greenhouse gases (GHG) are gas emissions that trap heat in the atmosphere. The primary long-lived GHGs directly emitted by human activities are carbon dioxide (CO_2), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Scientific evidence indicates a trend of increasing global temperature over the past century due to an increase in GHG emissions from human activities. The heating effect from these gases is considered the probable cause of the global warming observed over the last 50 years (Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the CAA; Final Rule 2009).

Executive Order (EO) 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis* was signed on January 20, 2021, and directs Federal agencies "to immediately review, and take action to address, Federal regulations promulgated and other actions taken during the last 4 years that conflict with national objectives to improve public health and the environment; ensure access to clean air and water; limit exposure to dangerous chemicals and pesticides; hold polluters accountable, including those who disproportionately harm communities of color and low-income communities; reduce GHG emissions; bolster resilience to the impacts of climate change; restore and expand our national treasures and monuments; and prioritize both environmental justice and employment."

Pursuant to EO 13390, the CEQ rescinded its 2019 *Draft National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions* and is reviewing, for revision and update, the 2016 *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews*. The CEQ recently advised that the 2016 Guidance is applicable to current NEPA reviews. As such, this EIS would consider the potential effects of the Proposed Action on climate change by assessing the change of GHG emissions under the Proposed Action.

3.3.2 Environmental Consequences – Air Quality

This section describes potential impacts to air quality for the Proposed Action and No Action Alternatives.

3.3.2.1 No Action Alternative

Under the No Action Alternative, RUS would not fund the proposed solar facility. The air quality condition would remain the same as the existing condition resulting in no direct or indirect impacts to air quality.

3.3.2.2 Proposed Action

Vehicle and equipment operation during construction and decommissioning would emit diesel particulate matter and other criteria air pollutants. Construction activities, particularly during site preparation, grading and trenching for inverter and substation installation, would generate fugitive dust in the form of PM_{10} and $PM_{2.5}$.

According to 40 CFR Part 93.123(c)(5), localized hot spot pollutant concentration analysis is not warranted for construction period air quality impact if construction-related activities would last five years or less at any individual site. As the construction activities are expected to last approximately 14 months, proposed construction activities are considered temporary and would not require a quantitative hot spot analysis. Given the short duration of construction and decommissioning activities, air quality impacts would be minor, direct, and short-term.

During operation, worker vehicles traveling to and from the site and those conducting maintenance activities would emit some pollutants. Because the proposed solar power generating process would not result in any air emissions, there is no requirement to obtain any air permits for pre-construction or operation under the Federal or state stationary source air permitting regulations.

Operation of the proposed solar plant would generate minimal GHG emissions and offset a significant quantity of GHG emissions generated from a non-renewable power plant in producing the same amount of energy supply as shown in Table 3.3-1. Potential air emissions offset by the Proposed Action would be much greater than the air emissions generated by non-renewable power plant operations. Compared to non-renewable power generation, the Proposed Action would be beneficial with respect to

GHG emissions and its effect on climate change. Therefore, overall, impacts during operations would be minor, direct, long-term, and beneficial.

Table 3.3-1. US Power Electricity Resulting CO_2 Emissions by Fuel

Fuel Type	CO_2 Emissions (pounds per megawatt hours)
Coal	2,210
Natural Gas	910
Petroleum	2,130

Source: (EIA 2021)

3.4 Acoustic Environment

The acoustic environment of a place or space is the sound from all sources that could be heard by someone in that place (receptor). This acoustic environment is shaped by the different sound sources that are present and also by modification of the sounds as they propagate along their paths from the sources to the receptor.

Noise is generally defined as unwanted sound. Human response to noise is subjective and can vary from person to person. Factors that can influence individual response include the intensity (loudness), frequency, and time pattern, and the amount of background noise.

3.4.1 Affected Environment – Acoustic Environment

3.4.1.1 Noise Terminology and Guidelines

To establish a uniform noise measurement that simulates people's perception of loudness and annoyance, the decibel measurement is weighted to account for those frequencies most audible to the human ear. This is known as the A-weighted sound level, or "dBA," and it is the descriptor of noise levels most often used for community noise. For most people to perceive an increase in noise, it must be at least 3 dBA above ambient noise levels. At 5 dBA, the change would be readily noticeable.

Because the sound pressure level unit of dBA describes a noise level at just one moment and very few noises are constant, other ways of describing noise over extended periods have been developed. One way of describing fluctuating sound is to describe the fluctuating noise heard over a specific time period as if it had been a steady, unchanging sound. For this condition, a descriptor called the "equivalent sound level," L_{eq}, can be computed. L_{eq} is the constant sound level that, in a given situation and time period (e.g., one hour, denoted by $L_{eq(1)}$, or 24 hours, denoted as $L_{eq(24)}$), conveys the same sound energy as the actual time-varying sound. The Day-Night Sound Level (i.e., L_{dn}) refers to a 24-hour average noise level with a 10 decibel (dB) penalty applied to the noise levels during the hours between 10 PM and 7 AM, due to increased sensitivity to noise levels during these hours. Statistical sound level

descriptors such as L_1, L_{10}, L_{50}, L_{90}, and L_x, are used to indicate noise levels that are exceeded 1, 10, 50, 90 and x percent of the time, respectively. For this EIS, both L50 and maximum noise level (L_{max}) are used as the descriptors for noise impact assessment.

Noise levels decrease as the distance from the noise source to the receiver increases. Noise generated by a point source nominally diminishes (attenuates) at an approximate rate of 6 dBA for each doubling of distance away from the source. Noise from a line source (e.g., roadway noise) attenuates at approximately 3 dBA per doubling of distance (FHWA 2011).

Given no state or local noise codes that are directly applicable to a solar facility, Wisconsin Administrative Code Public Service Commission Chapter 128.14 established noise criteria for wind energy systems is adopted as the guideline noise impact assessment of the EIS. The noise limits for the noise attributable to the proposed solar facility would be:

- 50 dBA during daytime hours; and
- 45 dBA during nighttime hours.

3.4.1.2 Existing Noise Condition

The Proposed Action would occur in a rural and undeveloped area. Dominant noise sources contributing to ambient noise levels in the neighborhood are traffic along local roadways, agricultural activities, wind, etc. Sensitive receptors are locations where occupants or individuals are more susceptible to excessive levels of noise including residences, educational establishments, places of worship, etc. The nearest residences are approximately 500 feet from the proposed inverters and 1,500 feet from the substation.

On October 2 and 4, 2018, an ambient background noise survey of the proposed substation and solar array (inverter) areas was conducted at a total of six sites. Three sites are placed near the proposed substation and an inverter area with the shortest distance from a residence, respectively. The monitored ambient noise levels at these six locations show a range of 34 to 58 dBA in terms of L_{50} the levels that are typical for a quiet rural area. The predominant noise sources in the area were neighborhood roadway traffic as observed in the Pre-Construction Sound Report (Appendix H) (Stantec 2019b).

3.4.2 Environmental Consequences – Acoustic Environment

This section describes potential impacts to the acoustic environment for the Proposed Action and No Action Alternatives.

3.4.2.1 No Action Alternative

Under the No Action Alternative, RUS would not fund the Proposed Action. The noise condition would remain the same as the existing condition resulting in no direct or indirect impacts to acoustic environment.

3.4.2.2 Proposed Action

Typical equipment to be used for the proposed construction and decommissioning and their maximum noise reference levels at several reference distances are presented in Table 3.4-1. The construction activities would last approximately 14 months. Construction activities would move across the site over time resulting in a relatively short duration noise at any sensitive receptor around the Project site. Therefore, the construction noise impacts would be short-term and minor. No noise mitigation measures are warranted during construction.

Table 3.4-1. Construction Equipment Noise Reference Level

Equipment	Lmax @ 50 Feet[1]	Lmax @ 500 Feet	Lmax @ 1500 Feet
Concrete Mixing Trucks	85	65	55
Bulldozers/Loaders/Backhoes	80-85	60-65	50-55
Excavators	85	65	55
Directional Boring Rigs	80	60	50
Graders	85	65	55
Trailers	84	64	54
Flatbed and Box Trucks	84	64	54
Pile Drivers	95	75	65
Service Trucks	55	35	25
Water Trucks	84	64	54

[1] Source: (FHWA 2006)

Badger State Solar would perform post-construction noise studies as described in the current version of the PSCW Noise Measurement Protocol. Within three months of the date when the authorized solar facility is operational, Badger State Solar would repeat the noise measurements conducted as the pre-construction noise study, measure the maximum noise created at the solar facility with all equipment and inverters on and while the panels auto-rotate, and measure the noise at the site with all units off.

Under the Proposed Action operational duration, potential noise impact levels were modeled for the entire substation and solar array (Stantec 2019b). The model-predicted maximum noise levels at the nearest sensitive receptors from the proposed plant operation would be 39 dBA around an inverter and 32 dBA around the substation, respectively. These levels are well below the PSC's 50-dBA limit applicable for daytime

hours and 45-dBA limit for nighttime hours. Therefore, the Proposed Action would result in negligible direct, long-term impacts, and no mitigation measures are warranted.

3.5 Biological Resources

3.5.1 Vegetation, Invasive Species, and Noxious Weeds

3.5.1.1 Affected Environment – Vegetation, Invasive Species, and Noxious Weeds

Vegetation

The Project site lies within Jefferson County, Wisconsin, and within the Southeastern Wisconsin Savannah and Till Plain ecoregion. This ecoregion is dominated by various forms of agriculture and fragmented woodlands (EPA 2000). Historically this ecoregion contained a mix of prairie, oak forests and savanna, and maple-basswood forests as well as wet-mesic prairies, southern sedge meadows, emergent marshes and calcareous dens (WDNR 2010). The tree species of relative importance for these forests include bur oak (*Quercus macrocarpa*), white oak (*Quercus alba*), black oak (*Quercus velutina*), and sugar maple (*Acer saccharum*) (WDNR 2015b). Additional native plant species include big bluestem (*Andropogon gerardii*), little bluestem (*Schizchyrium scoparium*), wild columbine (*Aquilegia canadensis*), common milkweed (*Asclepias syriaca*), common golden Alexander (*Zizia aurea*), bee balm (*Monarda fistulosa*), huckleberry (*Gaylussacia baccata*), and leadplant (*Amorpha canescens)* (WDNR 2016b). Today however, the dominant form of land use for this area is row crop agricultural production of predominantly corn, soybean and small grains (USDA 2017a). Agriculture comprises approximately 51 percent of the landscape within Jefferson County consisting of a mix of cropland, orchards, tree nurseries, etc. (JCLWCD 2021).

Jefferson County is located within the Rock River Basin which includes approximately 3,800 mi^2 of South-Central Wisconsin. The Rock River and its tributaries are spread over 10 counties inhabited by more than 750,000 residents. The county is largely rural in character with agriculture comprising nearly 75 percent of the land area. Most of the basin's surface waters are exposed to runoff pollution from both agricultural and urban land uses and many are exposed to wastewater discharge pollution. Only a few surface waterbodies within the basin are rated as excellent quality. Stream channelization, building of drainage ditches and draining of wetlands have contributed to flooding problems (Rock River Coalition 2018). The Project site is within the Lower Crawfish River watershed (north of US 18) and the Middle Rock River watershed (south of US 18) (WDNR 2020e).

Jefferson County and the Project site are located within the Southeastern Glacial Plains Ecological Landscape (WDNR 2015b). This ecological landscape encompasses 7,725 mi^2 (4,943,731 acres), representing 13.8 percent of the area of the state of Wisconsin. Land cover is primarily agricultural cropland. Remaining forests occupy only 11 percent of the land area, and major cover types include maple-basswood, oak, lowland hardwoods, and conifer swamps (mostly tamarack-dominated). No large areas

of upland forest exist except on the Kettle Interlobate Moraine. Wetlands are extensive (12 percent of the ecological landscape, 593,248 acres) and include large marshes and sedge meadows and extensive forested lowlands within the lower Wolf River floodplain. Forested lowlands are also significant along stretches of the Milwaukee, Sugar, and Rock Rivers. Only 4 percent of the Southeast Glacial Plains is in public ownership (226,230 acres), of which 58 percent is wetland and 42 percent is upland (WDNR 2015b).

Historically, vegetation in the Southeast Glacial Plains consisted of a mix of prairie, savanna, and oak forest, with maple-basswood forests, wet and wet-mesic prairies, sedge meadows, marshes, fens, and tamarack swamps. Agricultural and urban land use practices have drastically changed the land cover of the Southeast Glacial Plains. The prairies and savannas are all but gone, and the remaining forests are severely fragmented and occupy only about 10 percent of the total land area. The current land cover is primarily agricultural cropland. Agriculture often has major influences over remnant patches of other vegetation types as well as on aquatic resources (WDNR 2015b).

Badger State Solar submitted an application for a CPCN to the PSCW in 2019. A portion of this application was a vegetative survey of the Project site. The vegetative communities in the Project area were evaluated by a combination of aerial photographic review and field visits during 2018. The following summarizes the survey results:

Agricultural Land

- *Row Crops.* The dominant vegetation within the agricultural areas was row crop production comprised of corn (*Zea mays*) and soybeans (*Glycine max*).
- *Hay/Pasture Areas/Old Field.* A few pasture areas were dominated by common forage species such as alfalfa (*Medicago sativa*) or orchard grass (*Dactylis glomerata*).
- *Other Agricultural Areas.* Other agricultural areas were in mint (*Mentha sp.*) production. Common vegetation observed within or adjacent to the cultivated fields included common ruderal species such as ragweed (*Ambrosia spp.*), chufa (*Cyperus esculentus*), amaranth (*Amaranthus spp.)*, common plantain (*Plantago major*), and Canada thistle (*Cirsium arvense*).

Non-Agricultural Upland

- *Prairie/Grasslands.* The dominant vegetation within the non-agricultural upland areas was comprised of grassland areas along the perimeter and between agricultural fields and isolated woodland areas. The upland grasslands were dominated by reed canary grass (*Phalaris arundinacea*), quackgrass (*Elymus repens*), smooth brome (*Bromus inermis*), velvet leaf (*Abutilon theophrasti*), field penny cress (*Thlapsi arvense*), common milkweed (*Asclepias syriaca*), Queen Anne's lace (*Daucus carota*), giant ragweed (*Ambrosia trifida*), red-root amaranth

(*Amaranthus retroflexus*), Canada thistle, stinging nettle (*Urtica dioica*), and green foxtail (*Setaria viridis*).

- *Upland woods.* Upland woodlands located within the Project area were comprised of relatively small, isolated woodlots and perimeter areas within the agricultural landscape. These woodlands were primarily dominated by box-elder (*Acer negundo*), black cherry (*Prunus serotina*), American elm (*Ulmus americana*), white oak, and black walnut (*Juglans nigra*) trees. The shrub understory vegetation within these areas included Tartarian honeysuckle (*Lonicera tartarica*), nannyberry (*Viburnum lentago*) common buckthorn (*Rhamnus cathartica*), and common blackberry (*Rubus allegheniensis*).

Wetlands

- *Forested Wetlands.* A small amount of forested wetland was present within the Project area, and these areas are further described in Section 3.5.2.
- *Non-forested Wetlands.* The wetlands within the Project area were mostly comprised of non-forested wetland communities including wet meadow and farmed wetlands. Open water associated with waterways was included in this category. These wetlands and their dominant species are further described in Section 3.5.2.
- *Marshes, Bogs, and Fens.* Other non-forested wetland types such as marshes, bogs, or fens were not observed on the Project site (Badger State Solar 2019b).

Additionally, the land cover was digitized into a geographic information systems layer to quantify the existing site conditions into the categories (Table 3.5-1). The total land cover acreages within the Project area for each land cover category are provided in Table 3.5-1. These land cover evaluations are based on the observed assemblages based on survey data, and thus differ from the national landcover database evaluation which is satellite based.

Table 3.5-1. Total and Project Land Cover

Land Cover Classification	Project Area (acres)
Agriculture	
Row Crops	926.8
Hay/Pasture/Old field	7.1
Other Agriculture	189.4
Non-Agricultural Upland	
Prairie/Grassland	6.8
Upland Woods	30.3
Wetlands	
Non-Forested (including open water)	31.4
Forested Wetlands	1.1

Land Cover Classification	Project Area (acres)
Developed Land	
Residential	3.7
Commercial /Industrial (includes road right-of-way)	7.2
Project Area Total	**1203.9**

Source: (Badger State Solar 2019b)

Invasive and Noxious Plant Species

Invasive or noxious plant growth leads to displacement of native vegetative species, disruption of habitats, and overall reduction in biodiversity. A complete list of invasive species occurring in Wisconsin can be found in Wisconsin Invasive Species Rule – NR 40 (WDNR 2021d). Jefferson County has 226 reported invasive species (USDA 2021). As a direct result of the intensive agriculture in this area, Jefferson County and the Project site have the potential to host various invasive plants and noxious weeds. In compliance with EO 13112, the prevention, detection, monitoring, and control of invasive species is required for Federally funded projects (Executive Order 13112 1999). The invasive plants which have been identified by the City of Jefferson (approximately 3.5 miles east of the Project site) are Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), and musk thistle (*Carduus nutans L.*). These species are required to be destroyed in accordance with City Ordinance No. 86 (Town Board of Jefferson 2002). Other priority invasive plant species within Jefferson County include Crown vetch (*Coronilla varia*), Autumn olive (*Elaeagnus umbellata*), Common buckthorn (*Rhamnus carthartica*), Reed canary grass (*Phalaris arundinacea*), Knotweeds (*Polygonum* spp.), Teasels (*Dipsacus* spp.), Glossy Buckthorn (*Frangula alnus*), Wild Chervil (*Anthriscus sylvestris*), Oriental bittersweet (*Celastrus orbiculatus*), Spotted knapweed (*Centaures stoebe*), and Leafy spurge (*Euphorbia esula*) (Arcgis.com 2021). Table 3.5-2 contains selected invasive plant species in Wisconsin, potentially present at the Project site.

Restricted invasive species are already widely established in Wisconsin, while prohibited species are not present, or present in only a few places. Control of invasive species is important for maintaining the Wisconsin environment.

Table 3.5-2. Selected Regulated Terrestrial and Aquatic Invasive Species in Wisconsin

Scientific Name	Common Name	Status[1]
Terrestrial and Wetland Invasive Plants		
Achyranthes japonica	Japanese chaff flower	Prohibited
Aegopodium podagraria	Bishop's goutweed	Restricted
Akebia quinata	Fiveleaf akebia or chocolate vine	Prohibited
Artemesia absinthium	Wormwood	Restricted
Arundo donax	Giant reed	Prohibited

Scientific Name	Common Name	Status[1]
Berberis vulgaris	Common barberry	Prohibited
Cardamine impatiens	Narrow leaf bittercress	Prohibited
Celastrus loeseneri	Asian loeseneri bittersweet	Prohibited
Centaurea diffusa	Diffuse knapweed	Prohibited
Centaurea nigra	Black knapweed	Restricted
Centaurea nigrescens	Tyrop knapweed	Restricted
Centaurea repens	Russian knapweed	Prohibited
Coronilla varia	Crown vetch	Restricted
Digitalis lanata	Grecian foxglove	Prohibited
Fallopia x bohemicum or F. x bohemica or Polygonum x bohemicum	Bohemian knotweed	Prohibited
Filipendula ulmaria	Queen of the meadow	Restricted
Galium mollugo	White bedstraw	Restricted
Iris pseudacorus	Yellow flag iris	Restricted
Impatiens balfourii	Balfour's touch-me-not	Restricted
Impatiens glandulifera	Policeman's helmet	Prohibited
Knautia arvensis	Field scabiosa	Restricted
Linaria dalmatian	Toadflax	Prohibited
Lysimachia vulgaris	Garden yellow loosestrife	Restricted
Lythrum virgatum	Wanded loosestrife	Prohibited
Myosotis sylvatica	Woodland forget-me-know	Restricted
Oplismenus hirtellus ssp. undulatifolius	Wavy leaf basket grass	Prohibited
Petasites hybridus	Butterfly dock	Prohibited
Phalaris arundinaceae var. picta	Ribbon grass	Restricted
Phellodendron amurense	Amur Cork Tree	Prohibited
Pimpinella saxifrage	Scarlet pimpernel	Restricted
Populus alba	White poplar	Restricted
Ranuculus ficaria	Lesser celandine	Prohibited
Robinia hispida	Rose acacia	Restricted
Rubus armeniacus	Himalayan blackberry	Prohibited
Solidago sempervirens	Seaside goldenrod	Prohibited
Sorghum halepense	Johnsongrass	Prohibited
Taeniatherum caput-medusae	Medusahead	Prohibited
Tussilago farfara	Colt's foot	Prohibited
Typha laxmannii	Graceful cattail	Prohibited
Typha domingensis	Southern cattail	Prohibited
Valeriana officinalis	Garden heliotrope	Restricted
Wisteria floribunda/sinensis	Japanese/Chinese wisteria	Prohibited
Aquatic Invasive Species		
Bithynia tentaculate	Faucet snail	Prohibited
Bythotrephes cederstroemi	Spiney water flea	Prohibited

Scientific Name	Common Name	Status[1]
Eichhornia crassipes	Floating water hyacinth	Prohibited
Eichhornia azurea	Anchored water hyacinth	Prohibited
Caulerpa taxifolia	Killer algae	Prohibited
Cipangopaludina chinensis	Chinese mystery snail	Restricted
Corbicula fluminea	Asian clan	Prohibited
Didymoshenia geminate	Didymo	Prohibited
Dreissena polymorpha	Zebra mussel	Restricted
Dreissena rostriformis	Quagga mussel	Prohibited
Egeria densa	Brazilian waterweed	Prohibited
Hydrilla verticillate	Hydrilla	Prohibited
Hydrocharis morsus-ranae	Egyptian from-bit	Prohibited
Hygrophilia polysperma	Indian swampweed	Prohibited
Hydrocotyle ranunculoides	Floating marsh pennywort	Prohibited
Ipomoea aquatica	Water spinach	Prohibited
Iris pseudacorus	Yellow iris	Restricted
Limnophila sessiliflora	Asian marshweed	Prohibited
Melanoides tuberculate	Malaysian trumpet snail	Prohibited
Myosotis scorpiodes	Aquatic forget-me-not	Restricted
Najas minor	Brittle naiad	Prohibited
Najas marina	Spiny naiad	Restricted
Nitellopsis obtuse	Starry stonewort	Prohibited
Nymphoides peltate	Yellow floating heart	Prohibited
Oenanthe javanica	Java waterdropwort	Prohibited
Orconectes rusticus	Rusty crayfish	Restricted
Ottelia alismoides	Duck lettuce	Prohibited
Pistia stratiotes	Water lettuce	Prohibited
Potamogeton crispus	Curly-leaf pondweed	Restricted
Potamopyrgus antipodarum	New Zealand mud snail	Prohibited
Procambarus clarkia	Red swamp crayfish	Prohibited
Salvinia molesta	Giant Salvinia	Prohibited

[1] Restricted and Prohibited plants may not be transferred (bought, sold, given away), transported or introduced (imported or planted) in Wisconsin without a permit; Possession of restricted species is allowed, except for fish and crayfish; Prohibited species must be controlled and control of Restricted species is encouraged.
Source: (WDNR 2015a, WDNR 2016c)

3.5.1.2 Environmental Consequences – Vegetation, Invasive Species and Noxious Weeds

This section describes potential impacts to vegetation, invasive species, and noxious weeds for the Proposed Action and No Action Alternatives.

No Action Alternative

Under the No Action Alternative, RUS would not fund the Proposed Action. No direct or indirect Project-related impacts to vegetation, invasive species and noxious weeds would be expected to occur. Existing land use would remain primarily farmland, and vegetation resources would remain as they are at the present time. Therefore, impacts associated with the No Action Alternative would be negligible.

Proposed Action Alternative

Under the Proposed Action, vegetation, invasive plants, and noxious weeds would be affected due development of the solar production area, collection system, access roads, perimeter areas. Impacts would generally consist of the removal of all vegetation in the various areas that would be used for solar energy production.

The solar production areas are defined as all portions of the Project facilities located inside the proposed fencing of the Project site. These areas include the solar panels and associated facilities such as medium voltage cable stations, access roads, and collector lines (underground and overhead crossing). Impacts during construction would be mostly limited to agricultural lands to the extent practicable. However, there would be some localized clearing along fence-lines and small wooded areas. Larger forested areas that are within the fenced areas would be avoided. Once the solar panels and associated facilities have been installed, the surrounding area would be seeded with an appropriate herbaceous seed mix of native perennial grasses, sedges, and forbs. Table 3.5-3 below provides the total land cover impacts within the Project area.

Table 3.5-3. Solar Production Area Impacts in the Project Area

Land Cover Classification	Impact Area (acres)
Agriculture	
Row Crops	677.0
Hay/Pasture/Old field	0
Other Agriculture	120.9
Non-Agricultural Upland	
Prairie/Grassland	1.1
Upland Woods	2.0
Wetlands	
Non-Forested Wetlands (including open water)	4.5
Forested Wetlands	0
Developed Land	
Residential	0
Commercial /Industrial (includes road right-of-way)	<0.1
Project Area Total	**805.6**

The collection system is comprised of the underground and an overhead cabling infrastructure located between the solar production areas (outside fenced areas). The width of the collection system would vary depending on the number of cables in a given location. For the purpose of impact analysis in the application, installation of the underground collection system is estimated to be an approximate 15-foot wide temporary trench and the collection system would be installed utilizing a vibratory plow or trenching methods. Installation of the overhead collection system would include placement of transmission poles on either side of US 18 and placement of up to 15 lines that would span approximately 375 feet at least 17 feet above the highway. Table 3.5-4 presents the acreages of impacts in the Project area due to the collection system.

Table 3.5-4. Collection System Impacts in the Project Area

Land Cover Classification	Impact Area (acres)
Agriculture	
Row Crops	0.6
Hay/Pasture/Old field	<0.1
Other Agriculture	1.7
Non-Agricultural Upland	
Prairie/Grassland	0.2
Upland Woods	0.5
Wetlands	
Non-Forested Wetlands (including open water)	<0.1
Forested Wetlands	0
Developed Land	
Residential	0
Commercial /Industrial (includes road right-of-way)	0.1
Total	**3.1**

Access roads impacts for areas outside the solar production areas (outside fenced areas) are presented in Table 3.5-5. Access roads were estimated to be approximately 16-feet wide, located mostly within existing agricultural lands. Access roads may be comprised of a combination of temporary construction matting and grass/unimproved pathways. If areas are identified as having soil strength to support construction vehicles where vehicle traffic would be more frequent (i.e., site approaches), aggregate materials may be used.

Table 3.5-5. Access Road Impacts in the Project Area

Land Cover Classification	Impact Area (acres)
Agriculture	
Row Crops	0.7
Hay/Pasture/Old field	0
Other Agriculture	0.5
Non-Agricultural Upland	
Prairie/Grassland	<0.1
Upland Woods	0
Wetlands	
Non-Forested Wetlands (including open water)	<0.1
Forested Wetlands	0
Developed Land	
Residential	0.1
Commercial /Industrial (includes road right-of-way)	<0.1
Total	**1.4**

The perimeter areas of the Proposed Action are comprised of all areas within the site boundary that are not part of the solar production areas, collection system, access roads, and substation. The perimeter areas include most of the existing forested and wetland present on the site and would not be affected during construction or operation. Table 3.5-6 presents the acreages that would be impacted by the use of the perimeter areas.

Table 3.5-6. Perimeter Area Impacts

Land Cover Classification	Impact Area (acres)
Agriculture	
Row Crops	89.9
Hay/Pasture/Old field	7.1
Other Agriculture	45.0
Non-Agricultural Upland	
Prairie/Grassland	4.8
Upland Woods	19.5
Wetlands	
Non-Forested Wetlands (including open water)	21.3
Forested Wetlands	0.6
Developed Land	
Residential	3.6
Commercial /Industrial (includes road right-of-way)	6.7
Total	**198.5**

Overall, impacts would include the removal of all vegetation from the solar production areas, including invasive species and noxious weeds. During construction, care would be taken to avoid larger forested areas within the Project footprint. As the majority of the

Project site is agricultural, adverse impacts would be minimal since native species and prime ecological habitat are not currently present in abundance. After construction, impacts, would be moderately beneficial, as the site would be seeded with an appropriate native species mix for the duration of the Project.

During operations, maintenance activities would include the control and eradication of invasive species and noxious weeds. Additionally, areas outside the fence-line would be seeded with native grasses and other plants as part of the visual screening for adjacent properties.

Decommissioning impacts are considered to be similar to those during construction. After decommissioning, the Project site could be returned to agriculture or could remain fallow. If returned to agriculture, there would be no long-term negative impacts to vegetation, invasive species, or noxious weeds. The Project site would likely return to its current vegetative state. If allowed to go fallow, there could be a positive impact to vegetation as invasive species and noxious weed populations would have been eradicated over the years, and this would allow slow repopulation of native species including larger trees and shrubs. Therefore, adverse impacts to vegetation would be minor, and consist of the initial removal of all plant species in the solar production areas of the Project Site. In the long term, impacts would be moderately beneficial due to the eradication of invasive species and noxious weeds within the Project site.

3.5.2 Wetlands, Riparian Areas, and Floodplains

This section discusses existing wetlands, riparian areas, and floodplains on the Project site and potential impacts from the Proposed Action and No Action Alternatives.

3.5.2.1 Affected Environment – Wetlands, Riparian Areas, and Floodplains

Wetlands

Impacts to wetlands or other aquatic habitats may be subject to regulation under Section 404 of the CWA or state or Federal statutes. Wetlands are defined by the USACE as areas "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (USACE 1987). Wisconsin state statutes define a wetland as “an area where water is at, near or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation and which has soils indicative of wet conditions” (WDNR 2021o). Prior to performing certain activities in wetlands and depending on the size of the wetland and its hydrologic connectivity to a navigable waterway, a Section 404 permit from the USACE may be required. All wetlands in Wisconsin are protected under state law and many are protected under the CWA. In some locations, wetlands are also protected by local regulations and ordinances.

Wetland determinations and delineations were conducted by Stantec Consulting Services Inc. from July 9 to July 20 and from October 29 to October 30, 2018. Three wetlands were previously delineated by Tetra Tech on March 15, 2018 and were used as part of the Stantec delineation documentation (Appendix I). Wetland determinations were made using vegetation, soil, and hydrology criteria as defined in the USACE 1987 manual. Many of the wetlands present within the Project area were comprised of non-forested, herbaceous wetland communities with a small number being forested wetlands. There are no marshes, bogs, or fens in the Project area (Badger State Solar 2019a). The Project area does not contain sensitive wetlands, state or federally listed waterways per NR 103.04, Wisconsin Administrative Code (Badger State Solar 2019b).

During the wetland survey, 30 wetlands were documented on the Project site (see Figure 3.5-1 and Table 3.5-7)**.** Wetland types were one wet meadow/shrub-carr wetland/hardwood swamp complex (1.73 acres); one wet meadow/forested wetland complex (0.48 acres), 11 wet meadows (13.61 acres), and farmed wetlands/field depressions (10.79 acres). The majority of wetlands within the Project area consist of non-forested wet meadow and farmed wetlands that are low in quality and dominated by non-native or invasive species. Wetlands in the Project area have been impacted by adjacent farming activities and drainage manipulation. Wetland hydrology indicators observed at surveyed wetlands included surface water, high water table, saturation, algal mat or crust, stunted or stressed vegetation, geomorphic position, and a positive FAC-Neutral Test (Stantec 2019d).

The forested wetlands within the Project site are small, isolated communities or a minor component of the wet meadows (Table 3.5-7). The forested wetlands are comprised of hardwood swamp communities dominated by Bebb's willow (*Salix bebbiana*), Eastern cottonwood (*Populus deltoides*), and American elm trees. The dominant shrub/ground layer includes, Eastern cottonwood, reed canary grass, chufa, and orange jewelweed (Stantec 2019d). Dominant plant species in the no-forested wetlands (wet meadow, farmed wetlands and field depressions) are listed in Table 3.5-7.

Wetlands in Wisconsin have also been affected by invasive species which have been introduced by human activities such as urban development, recreation, farming, and gardening. In some instances, these non-native species can take over large areas of land and compete with native species for resources and habitats (WDNR 2015c). More specifically, reed canary grass and purple loosestrife have created monocultures creating competition for many of the native plant species resulting in the reduction of food sources for wildlife and birds. Many of the wetlands delineated during the surveys contain red canary grass (Stantec 2019d).

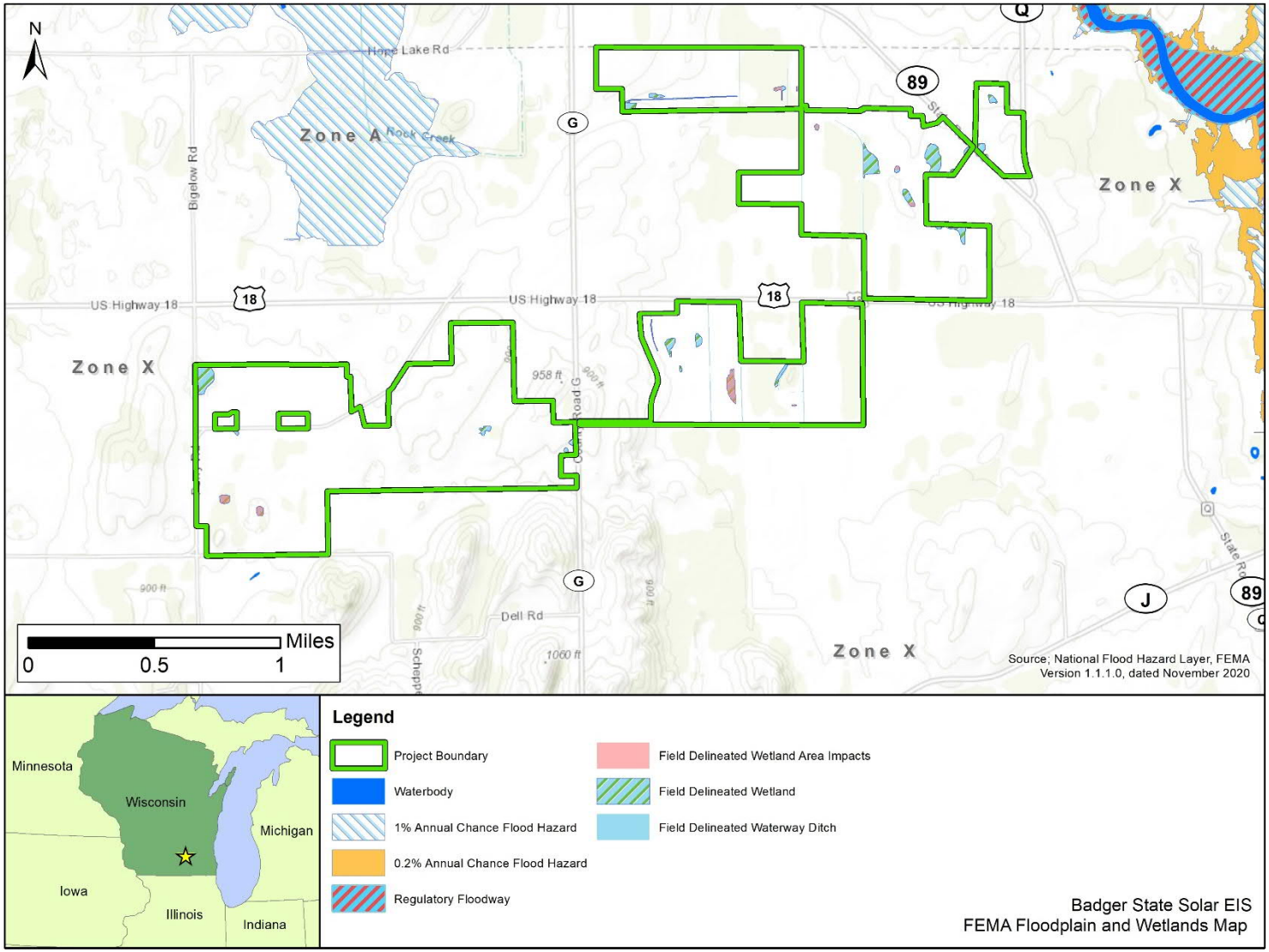

Figure 3.5-1. Wetlands and Floodplains in the Badger State Solar Project Area

Table 3.5-7. Wetlands within the Badger State Solar Project Area

Wetland ID	Acreage	Farmed (Yes/No)	WWI Mapped Wetland (Yes/No)	Invasive Species Present (Yes/No)	Wetland Functional Value / Impacted (Yes/No)	Wetland Type: Dominant Vegetation
W01	1.73	No	No	Yes	Medium / No	Components of wet meadow, shrub-carr, and hardwood swamp: Bebb's willow, Eastern cottonwood, American elm, white mulberry, gray dogwood, chufa, reed canary grass, and orange jewelweed. Wetland located along a drainage swale.
W02	0.49	Yes	No	Yes	Low / No	Farmed wetland: stunted / Stressed corn, chufa, and crabgrass
W03	0.48	Yes	No	Yes	Low / Yes	Farmed wetland: Stunted / stressed corn, and common purslane.
W04	0.05	No	No	Yes	Low / Yes	Farmed field depression: Roughfruit amaranth and barnyard grass.
W05	0.20	No	No	Yes	Low / Yes	Farmed field depression: Rroughfruit amaranth and barnyard grass.
W06	3.26	No	Yes	Yes	Medium / No	Wet meadow: Reed canary grass and stinging nettle.
W07	0.28	Yes	No	Yes	Low / Yes	Farmed wetland: Stunted / stressed corn and nodding spurge.
W08	3.51	Yes	No	Yes	Low / No	Farmed wetland: American water plantain, northern water plantain, nodding spurge, blunt spikerush, and reed canary grass.
W09	0.16	Yes	No	No	Low / No	Farmed wetland: Devoid of vegetation due to saturation/standing water during time of crop planting.
W10	0.45	No	No	Yes	Low / No[a]	Wet meadow: Reed canary grass and roughfruit amaranth.
W11	1.08	Yes	No	No	Low / Yes	Farmed wetland: Planted with a mint cultivar dominated eastern cottonwood seedlings.
W12	0.33	Yes	No	No	Low / No	Farmed wetland: Mint cultivar.
W13	1.63	Yes	No	No	Low / No	Farmed wetland: Mint cultivar.
W14	0.25	Yes	No	No	Low / No	Farmed wetland: Mint cultivar.
W15	0.22	No	Yes	No	High / No	Farm drainage ditch: Reed canary grass

Wetland ID	Acreage	Farmed (Yes/No)	WWI Mapped Wetland (Yes/No)	Invasive Species Present (Yes/No)	Wetland Functional Value / Impacted (Yes/No)	Wetland Type: Dominant Vegetation
W16	0.99	No	No	Yes	Low / No	Wet meadow: Barnyard grass, spotted lady's thumb, red root amaranth, sandbar willow, cattail, and path rush in agricultural field.
W17	0.68	No	No	Yes	Low / No	Wet meadow: Reed canary grass, path rush, and cinnamon willow herb in agricultural field.
W18	0.13	No	No	Yes	Low / No	Wet meadow: Dark green bulrush and path rush in agricultural field.
W19	2.06	No	No	Yes	Low / Yes	Wet meadow: Red root amaranth in agricultural field.
W20	0.72	No	No	Yes	Low	Wet meadow: Path rush and Torrey's rush in agricultural field.
W21	0.04	No	No	Yes	Low / Yes	Wet meadow: Path rush in agricultural field.
W22	0.59	No	No	Yes	Low / No	Wet meadow: Reed canary grass surrounded by an upland forest.
W23	0.40	No	No	Yes	Low / No	Wet meadow: Cattail and reed canary grass in agricultural field.
W24	0.18	Yes	No	No	Low / No	Farmed wetland: Devoid of vegetation due to saturation/standing water during time of crop planting.
W35	4.29	No	Yes	Yes	Low / No	Wet meadow: Reed canary grass.
W36	0.25	Yes	No	Yes	Low / Yes	Farmed wetland: Switchgrass and eastern cottonwood saplings.
W37	0.78	Yes	Yes	No	Low / Yes	Farmed wetland: Corn.
W38	0.57	Yes	Yes	No	Low / Yes	Farmed wetland: Corn.
W40	0.48	No	No	Yes	Medium / No	Wet meadow and Forested wetland: Reed canary grass and eastern cottonwood.
W41	0.55	Yes	No	Yes	Low / Yes	Farmed wetland: Water plantain (Alissma subcordatum) and spike rush.

Source: (Stantec 2019d)
[a] No impact; crossed using horizontal directional drill.

Riparian Areas

Project facilities would intersect six jurisdictional waterways. Riparian vegetation provides natural corridors for wildlife movement, helps maintain soil moisture in riparian soils, provides bank stabilization, filters stormwater runoff, maintains cooler water temperatures, and supports plant and wildlife populations (Schumacher 2019).

Floodplains

A floodplain is the relatively level land area along a stream or river that is subject to periodic flooding. The area subject to a 1-percent chance of flooding in any given year is normally called the 100-year floodplain. The area subject to a 0.2-percent chance of flooding in any given year is normally called the 500-year floodplain. The Federal Emergency Management Agency (FEMA) produces maps which show the likelihood of an area flooding. These maps are used to determine eligibility for the National Flood Insurance Program.

The objective of EO 11988 Floodplain Management is "…to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative". The EO is not intended to prohibit floodplain development in all cases. The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative.

The nearest Special Flood Hazard Zone is located approximately 0.5 miles northeast of the Project site and associated with Crawfish River (Figure 3.5-1).

3.5.2.2 Environmental Consequences – Wetlands, Riparian Areas, and Floodplains

This section describes potential impacts to jurisdictional wetlands, riparian areas, and floodplains for the Proposed Action and No Action Alternatives.

No Action Alternative

Under the No Action Alternative, RUS would not fund the Proposed Action. No direct or indirect Project-related impacts to wetlands and riparian areas would be expected to occur. Existing land use would remain primarily farmland, and water resources would remain as they are at the present time.

Proposed Action Alternative

Wetlands

The Proposed Action was planned to avoid and minimize impacts to wetlands and waterways to the extent practicable during the site selection and design phase of the Project. The Project area was selected because of its relative lack of large wetland systems and its location in an upland area already disturbed by agricultural

developments. During construction, work within wetlands and riparian zones would be avoided to the greatest extent feasible. Throughout the Project, BMPs (e.g., silt fences, hand-clearing of vegetation where necessary, etc.) would be implemented to minimize soil disturbance in or near wetlands and jurisdictional streams, and BMPs in accordance with requirements of the Project's Sediment and Erosion Control Plan and SWPPP would be followed. Table 3.5-8 summarizes wetland impacts by wetland type and impact type.

Table 3.5-8. Wetland Impacts by Wetland Type

Wetland Type	Temporary Impacts (acres)	Wetland Conversion Impacts (acres)
Farmed Wetland	2.36	0.00
Wet Meadow	2.10	0.00
Hardwood Swamp, Farmed Wetland	0.00	0.00
Total	4.46	0.00

No permanent wetland impacts are anticipated. The Proposed Action would temporarily impact 10 wetlands as a result of placement of timber matting for access roads and construction of the solar panel facilities. Installation of the underground collection system would also involve crossing two wetlands (W10 and W41) using HDD. HDD entry and exit points would be sited in upland areas, and HDD crossings would not result in wetland impacts (Schumacher 2019).

Impacts from installation of solar panels would occur within 10 wetlands in the Project area. Installation of the solar panels would involve driving piles to create support structures for the solar panels. This installation method would require no excavation or concrete footings thereby avoiding permanent impacts to wetlands. Installation of fencing in wetlands would likewise be achieved by driving fence posts and therefore would not result in discharge of fill in wetlands.

Temporary construction mats (i.e. timber mats) would be installed in up to 10 wetlands, as necessary, to distribute the weight of heavy equipment to avoid direct impacts to wetland vegetation and soils when crossing wetlands. Each wetland would be evaluated individually prior to construction to determine if the wetland is stable enough to support heavy equipment crossing without causing significant disturbance to the wetland such as soil compaction and rutting. In wetlands which are deemed stable enough to preclude significance disturbance, low ground-pressure tracked equipment would be used when accessing construction areas across these wetlands. If wetlands are determined to be unstable (i.e. soft, saturated soils and/or inundated by water), construction matting would be installed and tracked vehicles would cross on the matting. If field conditions require the use of construction matting to minimize the impacts to wetlands, up to 3.55 acres (154,564 square feet) of matting would be utilized

in the Project area and would result in an equal amount of temporary impact to wetlands in these two areas.

Impacts to wetlands during construction would be permitted under applicable Federal and state requirements and construction would be carried out in accordance with the Project's CWA Section 404 permit and WDNR Section 401 Water Quality Certification. According to the final decision of the PSCW, compensatory wetland mitigation would not be required for the Project per Wisconsin Statute 30.025 (PSCW 2020). Construction would be carried out in accordance with the WPDES Stormwater/Runoff Permit, the Project's SWPPP and applicable BMPs would be used. Impacts to wetlands during operation of the solar facility, are not anticipated. Impacts from construction activities during facility decommissioning would be similar to those during facility construction as the site is restored. Therefore, direct or indirect impacts to wetlands from construction and decommissioning are expected to be minor and short-term, no impacts are expected during operations.

Riparian Areas

The Proposed Action would intersect jurisdictional waterways at 17 locations within the Project area. Ten of the crossings would be completed using the HDD method for installation of the collector system thereby avoiding impacts at these crossings. Seven crossings would be required for construction of permanent access roads; each of these crossings would involve installation of a culvert and backfill. The remaining four crossings have an existing culvert and would not require improvements; no impacts would occur at these crossings. The overhead crossing over US 18 is not near any jurisdictional waterways and would not cause any impacts to waterways. Impacts to waterways would be permitted and construction would be carried out in accordance with the Project's CWA Section 404 permit and WDNR Section 401 Water Quality Certification. Surface water impacts are discussed in Section 3.2.2. Impacts to riparian buffer areas are discussed below.

Installation of fences across waterways would occur at 13 crossings in the Project. Fences would be woven wire with wooden posts driven into the banks of waterways; no structures or materials would be placed within waterways. Fences across waterways could impact recreational use and may catch debris and other material which could impact the flood flow capacity of the waterway (Schumacher 2019).

Construction activities within and adjacent to waterways would potentially impact riparian zones and may have indirect impacts on water quality and wildlife habitat. The removal of riparian vegetation could result in increased water temperatures and adversely affect cold water habitats. Removal of riparian vegetation would decrease shoreline protection and may lead to increased nutrient loading, sedimentation of waterways, and increased potential for invasive and nuisance plant species colonization (Schumacher 2019). However, silt fencing would be installed where existing vegetation is removed. If soil stockpiles are required, they would be protected on the downstream side to prevent sediment runoff into waterways. No impacts to downstream waterways

from sediment runoff are expected during Project construction. Further, any dewatering discharges, if necessary, would be made to vegetated upland areas where the water would filter. Heavy equipment operation within riparian zones could compact soils and alter hydrology, particularly in riparian areas with seeps and springs (Schumacher 2019).

Indirect impacts to wetlands and waterways would result from the overall loss of vegetation and potential changes in water quality due to stormwater runoff during construction, temporarily affecting water quality within the Project area and immediately downstream. Impacts would be similar to those described for surface water resources in Section 3.2.2. Although the Proposed Action would require significant grading, the grading plan would be designed to disturb the least amount of soil possible and minimize soil disturbance to the extent practicable. Soil runoff from construction would contain sediment and could contain pollutants. Increased turbidity and localized sedimentation of streams may occur from the increased runoff. Waterways/drainage ditches would be protected in high impact areas such as site grading locations by the use of silt fence and vegetative buffer strips. Construction activities would comply with the Project's WPDES/Stormwater Runoff Permit. Surface water quality impacts during construction would be temporary and minor and would not significantly alter long-term water quality conditions. Further, Badger State Solar would require a SPCC Plan from the contractor awarded the construction contract that would outline procedures and preventive measures to be followed throughout the construction period (Schumacher 2019). The SPCC Plan would meet all EPA requirements.

Impacts to riparian areas during construction would be permitted under applicable Federal and state requirements and construction would be carried out in accordance with the Project's CWA Section 404 permit and WDNR Section 401 Water Quality Certification. According to the final decision of the PSCW, compensatory wetland mitigation would not be required for the Project per Wisconsin Statute 30.025 (PSCW 2020). Construction would be carried out in accordance with the WPDES Stormwater/Runoff Permit, the Project's SWPPP and applicable BMPs would be used to minimize potential direct and indirect impacts. Impacts to riparian areas during operation of the solar facility, are not anticipated. Impacts from construction activities during facility decommissioning would be similar to those during facility construction as the site is restored. Therefore, direct or indirect impacts to riparian areas from construction or decommissioning are expected to be minor and short-term, no impacts are expected during operations.

Floodplains

The Proposed Action has been designed to avoid and minimize impacts to sensitive area such as floodplains. There are no floodplains present within the Project boundary. The closest FEMA floodplain is approximately 0.5 miles northeast of the Project area. There would be no direct or indirect impacts to floodplains from construction, operation and decommissioning of the Proposed Action.

3.5.3 Wildlife Resources

3.5.3.1 Affected Environment - Wildlife Resources

The Project site lies within the Southeastern Wisconsin Savanna and Till Plain (Omernik et al. 2008). This ecoregion supports a mix of agriculture (cropland and dairy operations) and forest. Most of the original vegetation has been cleared with forested areas remaining only on steeper end moraines and poorly drained depressions. The wildlife changed dramatically when grasslands were plowed and forests cleared for agriculture (WDNR 2015b). Intensive, widespread agriculture has resulted in a matrix of farm fields and isolated forest and wetland patches that benefit common wildlife and bird species such white-tailed deer (*Odocoileus virginianus*) and wild turkey (*Meleagris gallopavo*), but do not provide habitat for rare grassland or forest interior species. Important wildlife of the ecoregion includes white-tailed deer, gray wolf (*Canis lupus*), American black bear (*Ursus americanus*), wild turkey, northern bobwhite (*Colinus virginianus*), sandhill crane (*Antigone canadensis*), and trumpeter swans (*Cugnus buccinator*).

In an effort to support the conservation of sensitive organisms, Jefferson County has established environmental corridors which protect natural areas and environmentally sensitive areas (JCLWCD 2021). The Lake Mills State Wildlife Area, approximately 3 miles northwest of the Project area, is the closest state-managed area to the Project site. Common wildlife that could occur on or near the Project site includes American toad (*Anaxyrus americanus*), wild turkey, killdeer (*Charadrius vociferus*), song sparrow (*Melospiza melodia*), muskrat (*Ondatra zibethicus*), white-tailed deer, Northern short tailed shrew (*Blarina brevicauda*), clouded sulfur (*Colias philodice*), monarch (*Danaus plexippus*), and common green darter (*Anax junius*) among other wildlife and bird species (iNaturalist 2021). Migratory bird species potentially occurring on the Project site are further discussed in Section 3.5.5.

The majority of the Project site is actively farmed, so overall species diversity is expected to be relatively low. Most wildlife species expected to be present are widespread in occurrence, adapted to open field habitats, and relatively common in the region. During the winter, the agricultural fields are likely to be used by waterfowl and other birds feeding on crop residues.

3.5.3.2 Environmental Consequences – Wildlife Resources

This section describes the potential impacts to wildlife resources should the Proposed Action or No Action Alternative be implemented.

No Action Alternative

Under the No Action Alternative, RUS would not fund the Proposed Action. Existing land use would remain as primarily farmland with some undeveloped areas. Erosion and

sedimentation from farm practices on the Project areas would continue to affect runoff patterns and downstream habitats resulting in minor, indirect, long-term impacts.

Proposed Action Alternative

Direct impacts to most wildlife species from the Proposed Action would be temporary and short-term in nature. Impacts resulting from construction activities would consist primarily of temporary displacement and disturbance. To the extent practicable, the Proposed Action has been designed to avoid areas most likely to contain wildlife habitat (i.e., forest areas and wetlands). Permanent or long-term impacts to wildlife would primarily be limited to the installation of fences around the Project facilities, which would limit species movement across the landscape.

Direct impacts to wildlife under the Proposed Action are anticipated to be limited. The abundance and diversity of wildlife living within the Project area where solar arrays would be installed are limited due to the agricultural activities in these areas historically and currently. Wildlife present at the time of construction would be disturbed and mobile individuals would be displaced by construction activities. Disturbance, displacement, and direct mortality of individual animals likely would occur during the period when heavy equipment is used for clearing, grading, and excavation. Mobile animals, including birds, larger mammals, and some reptiles, can avoid such disturbances and move to safer areas. However, small, less-mobile animals, such as amphibians, turtles, and small mammals, are likely to be at much greater risk of mortality. Mortality of eggs and nestlings also could occur if they are present during the construction period. Although wildlife displaced by clearing activities and associated noise can find refuge in nearby undisturbed habitats, temporary reductions in population could occur as a result of increased predation and competition in these habitats. Prior to construction, Badger State Solar would work with PSCW and WDNR staff on developing a vegetation management plan that minimizes impacts to ground nesting birds and creates an environmentally sustainable ground cover on the solar array sites. During construction, Badger State Solar intends to implement the mitigation measures summarized in Section 2.5 to avoid or minimize potential adverse impacts on wildlife.

Following the completion of Project construction, site stabilization, and revegetation, species adapted to grassland, herbaceous fields, and ecotones between the fields and forests would likely reoccupy most of the affected areas, if they are not excluded by the perimeter fence. Perimeter fencing would provide for the passage of smaller wildlife such as possum, raccoon, and rabbit while keeping larger mammals such as whitetail deer excluded. Most of the species that currently utilize the agricultural fields and ecotones within the Project area would be well-adapted to the herbaceous community that would be established in the areas of solar arrays. Minor shifts in species composition may occur due to the change in disturbance regime and the shift to periodically mowed grass and herbaceous fields. Badger State Solar would develop and implement a training, response, and reporting system for any incidental wildlife

observations and provide an annual report of any incidents recorded by the system to PSCW and WDNR staff to track impacts.

Operation of the Proposed Action would continue to cause minor disturbance to wildlife as a result of noise and human activity, and movements between habitats would be permanently impeded due to the boundary fence. The Project perimeter security fence would be a 7- to 8-foot (2.1 to 2.4 meters) high deer exclusion fence. The Project area would be revegetated with perennial grasses, and native prairie grass, sedge, and forb mix may be used in open spaces between panel blocks and areas between the perimeter security fence and property boundaries to improve aesthetics and provide new habitat in previously cleared areas. The fence would prohibit most terrestrial species from travelling freely through the landscape, potentially fragmenting habitat and inhibiting species from reaching nearby riparian habitats. Potential impact from avian species collision with solar panels is discussed in Section 3.5.5.

Overall, direct impacts on wildlife as a result of the Proposed Action would be minor and long-term. These impacts would be minimized by the ability of mobile species to colonize similar habitats surrounding the Project area and to recolonize the Project area after the completion of construction and revegetation. The habitat acreage that would be permanently lost would be a small component of the accessible, undeveloped habitat in the immediate vicinity to which animals can disperse with minimal effects on populations. Indirect impacts from displacement of individuals and temporary disturbance due to construction activities and associated noise also would be minor because displaced wildlife would colonize similar habitats that are abundant in adjacent areas.

3.5.4 Fisheries and Aquatic Resources

3.5.4.1 Affected Environment – Fisheries and Aquatic Resources

The Project area does not contain sensitive wetlands, state or Federally listed waterways, fisheries, trout streams, wilderness areas, recreational areas, sensitive resources of state or Federal concern, or other special natural resource areas as described in NR 104.04, Wisconsin Administrative Code. There are waterways present on the Project site (see Figure 3.5-1). Lakes and streams that lie within 3 miles of the Project site include Mud Lake, Red Cedar Lake, Lake Ripley, Rock Lake, Rock Creek, Crawfish River, and Rock River.

Waterways that are present on the Project site were identified in a waterway delineation conducted by Stantec on behalf of Badger State Solar during the wetland delineation survey conducted on July 9 to July 20 and from October 29 to October 30, 2018. Waterways within the Project site were identified as intermittent and perennial steams (Table 3.5-9). The majority of the waterways identified serve as agricultural or roadside ditches which convey drain tile discharge (Badger State Solar 2019b). Of the 12 waterways identified in the Project area, 11 had perennial flow and one was

intermittent/perennial. Substrates consisted of muck, muck and sand, or sand. Ordinary High Water Mark (OHWM) widths varied from 3 to 10 feet and from 0.25 to 3 feet. Due to the current land use of the Project area being primarily for agricultural and drainage purposes, fisheries and other aquatic resources would be limited in the waterways present. Organisms most likely to be present in waterways on the Project site are aquatic macroinvertebrates and perhaps amphibians and reptiles such as turtles.

The majority of waterways within the Project site are associated with agricultural drainage practices and all are small. The perennial waterways would support greater biodiversity of aquatic organisms than the intermittent waterways, and fish would not be expected to occur in intermittent waterways. Seasonal or intermittent waterways (drainage ditches) would support temporary macrophytes and aquatic invertebrates but are likely to support comparatively lower species richness than perennial waterways (Williams et al. 2003). Agricultural ditches generally are expected to be more species-poor than ponds, lakes, streams, and rivers. Lower species richness in agricultural ditches as compared to other waterbodies has been attributed to the effects of herbicide, pesticide, and nutrient runoff (Hill et al. 2016). None of the waterways on the Project site are expected to support fisheries. However, agricultural ditches can provide valuable habitat in intensively farmed areas and provide recruitment of organisms to downstream waterbodies. The characteristics, water quality, and aquatic biota of major waterbodies within 3 miles from the Project site are described below.

Table 3.5-9. Delineated Waterways Within the Badger State Solar Project Area

Waterway ID	Top of Bank Width (feet)	OHWM Width (feet)	Top of Bank Height (feet)	OWHM Height (feet)	Substrate	Waterway Type
WW1	8	0.25	1	0.25	sand	Intermittent
WW2	22-25	7-10	6-8	2	muck	Perennial
WW3	20	5	6	2	muck	Perennial
WW4	23	14	6	3	muck	Perennial
WW5	15	6-8	4	2-3	muck	Perennial
WW6	16-18	5-8	4-5	1-2	muck	Perennial
WW8	17-22	7-8	5-9	1-2	muck, sand	Perennial
WW9	20	4-8	4	1-2	muck	Perennial
WW10	10-20	4-10	3-10	1-4	muck, sand	Perennial
WW11	10-23	3-10	10	4	muck, sand	Intermittent/Perennial
WW12	20	7	9	3	muck	Perennial
WW13	22	10	8	4	muck	Perennial

Source: (Stantec 2019d)

Rose Lake lies about 2 miles south of the Project area and occupies 49.38 acres. This lake has been classified as a shallow seepage under the state's Natural Community Determinations. This lake is monitored for fishing and swimming and is not considered impaired. As of 2017, fish and aquatic life and fish consumption were given ratings of "good" which contributed to Rose Lake's overall general rating of "good" (WDNR 2017).

Mud Lake lies 2.75 miles north of the Project area. This lake is in the Lower Crawfish River Watershed, characterized as a deep lowland natural community, and occupies 83.52 acres. Mud Lake is a small drainage lake in the marsh deposits south of Rock Lake. Fishes in this lake include Northern pike, largemouth bass, bluegills, black crappies, and bullheads. Recreation and fish and aquatic life have been rated as "poor". Fish consumption has been rated "good." Overall, this lake has been rated "poor" and been classified as impaired due to eutrophication and excess algal growth from total phosphorus amounts present (WDNR 2021i).

Red Cedar Lake lies approximately 3 miles south-southwest from the Project area and occupies 343.7 acres. Red Cedar Lake has been classified as a Shallow Seepage with a maximum depth of 6 feet. Fish currently in the lake include Panfish. In 2012, Red Cedar Lake was placed on the impaired waters list for excess algal growth. Assessments in 2018 demonstrated chlorophyll a data exceeding the Wisconsin Consolidated Assessment and Listing (WisCALM) thresholds for recreation used and continued to demonstrate excess algal growth. In addition, total phosphorus was below the recreation use and fish and aquatic life use thresholds. Fish and aquatic life, recreation, and fish consumption were all rated "good" with Red Cedar Lake receiving an overall rating of "good" for the general condition (WDNR 2021j).

Lake Ripley lies 3 miles west of the project area and occupies 419.51 acres. This lake has been characterized as a deep lowland natural community. Monitoring efforts in 2021 concluded that this lake was in excellent condition with good water quality and very good sport fishery. *Escherichia coli*, total phosphorus, and chlorophyll sample data were below WisCALM thresholds (WDNR 2021f).

Rock Lake lies 4 miles north of the project area and occupies 1,364.58 acres and has been characterized as a high-quality mesotrophic lake. Monitoring efforts for trends began in 1986 and continued until 1998. In 1999, WDNR began baseline monitoring on Rock Lake. Continued monitoring of the lake indicated that water quality was good, but lake fertility was increasing. This increase in lake fertility could lead to more algae blooms. Efforts in the past have included treating this lake but have ceased due to potential harm to fish habitats. Polluted runoff is the greatest threat to this lake. Residential development and agricultural runoff have contributed to polluted and nutrient runoff creating water quality concerns. Recent monitoring efforts in 2021 indicated that overall this lake is in excellent condition with fish and aquatic life being rated "excellent", recreation rated "excellent", and fish consumption rated "fair" due to mercury levels in fish tissues (WDNR 2021l).

Rock Creek is in the Lower Crawfish watershed and runs 11.97 miles in Jefferson County. This creek runs between Rock Lake and Mud Lake and continues south of Mud Lake with its closest point approximately 0.25 miles away from the Project area. Rock Creek is currently managed for fishing and swimming but is not considered impaired. This creek is considered a cool-cold headwater, macroinvertebrate, warm headwater, and cool-warm headwater under Wisconsin's Natural Community Determinations. In 2018, Rock Creek was assessed, and phosphorous levels exceeded the WisCALM criteria for the fish and aquatic life usage. No macroinvertebrate or fish Index of Biotic Integrity scores were available to determine the level of biological impairment. Overall, its condition is "poor" and proposed for the impaired waters list (WDNR 2021k).

Crawfish River lies east and approximately 0.5 miles from the Project area. Crawfish River is an 80-mile river located in the Lower Crawfish Watershed. This river has been classified as a coldwater, macroinvertebrate, warm headwater, warm mainstem, and cool-warm headwater under the state's Natural Community Determinations. In 2014, this river was placed on the impaired waters list for total phosphorous and sediment/total suspended solids present. Assessments conducted in 2016 also found continued impairment by phosphorous as total phosphorous data exceed the WisCALM criteria for fish and aquatic use. Biological data did not indicate impairment and based on recent information this river has not been removed from the impaired water listing. Overall, its general conditions have been given a rating of "excellent" (WDNR 2016a).

Rock River lies 2.5 miles east of the Project area. This river is a tributary of the Mississippi River and is approximately 299-miles long. Rock River is considered to have cool-cold headwater, macroinvertebrate, shallow lowland, warm headwater, large river, and cool-warm headwater communities based on the state's Natural Community Determinations. Sport fisheries in this river include white bass, crappies, catfish, northern pike, walleye, and largemouth bass. Other fishes include yellow perch, small mouth bass, bluegill, longnose gar, sheepshead, and bowfin. This river has been subject to monitoring due to poor conditions and has been classified as impaired. Impairments include low dissolved oxygen, eutrophication, and degraded biological communities from total phosphorous levels exceeding WisCALM criteria. Monitoring of *E. coli* levels were found to be within WisCALM criteria. However, total phosphorous levels still exceed WisCALM criteria for fish and aquatic life. Fish and aquatic life is rated "poor" while fish consumption is rated "good". Currently this river has a general condition rating of "poor" (WDNR 2021m).

3.5.4.2 Environmental Consequences – Fisheries and Aquatic Resources

This section describes the potential impacts to fisheries and aquatic resources should the Proposed Action or No Action Alternative be implemented.

No Action Alternative

Under the No Action Alternative, RUS would not fund the Proposed Action. Existing land use would remain primarily farmland, and effects on fisheries and aquatic resources would remain as they are at the present time. However, indirect impacts to fisheries and aquatic resources could result due to the continuing use of the Project area as agricultural land. Since there would be no conversion from straight row crop to solar farm, nutrient-laden runoff from agricultural fields could continue to enter waterways and have minor, long-term, adverse impacts on fisheries and aquatic resources.

Proposed Action Alternative

Construction of the Proposed Action would involve installation of culverts and associated backfill at six waterway crossings (Table 3.5-10). The ten collector waterway crossings would be completed using HDD. The potential effects on fisheries and aquatic resources are discussed below.

All of the waterways crossed are unnamed tributaries to the Crawfish River, which is classified as a coldwater stream, impaired for total phosphorous and suspended solids (WDNR 2016a). Most of the unnamed tributaries within the Project area are under 20 feet in width from top of bank and are not large enough to support recreational fisheries. However, the Proposed Action would have direct and indirect impacts on small fish and macroinvertebrates, such as amphipods, crustaceans, and insects with aquatic life stages, such as flies, dragonflies, mosquitos, and beetles. To the extent practicable, Badger State Solar would limit in-stream construction to that required for installation of culverts for access roads, and the connector crossings would be completed using HDD to avoid additional impacts. Any spoils would be placed in upland areas outside of the riparian zone and sediment barriers would be used to prevent erosion of soil or sediment into wetlands or waterways.

Table 3.5-10. Delineated Waterways Potentially Impacted

Waterway ID	Waterway Type	Top of Bank Width (feet)	Impact Reason	Impact Type	Impact Size (ft^2)	Permit Required
WW2	Perennial	22-25	access	structure/ fill	267	Yes
			collector	none	0 (HDD)	No
WW3	Perennial	20	access	structure/ fill	175	Yes
			collector	none	0 (HDD)	No
WW6	Perennial	16-18	access	structure/ fill	488	Yes
			collector	none	0 (HDD)	No

Waterway ID	Waterway Type	Top of Bank Width (feet)	Impact Reason	Impact Type	Impact Size (ft^2)	Permit Required
WW9	Perennial	20	access	structure/ fill	389	Yes
			collector	none	0 (HDD)	No
WW10	Perennial	10-20	access	structure/ fill	501	Yes
			collector	none	0 (HDD)	No
WW11	Intermittent / Perennial	10-23	access	structure/ fill	462	Yes
			collector	none	0 (HDD)	No

Source: (Badger State Solar 2019b)
HDD = horizontal directional drill crossing

Construction would involve clearing vegetation on stream banks and installation of culverts at six waterway crossings. Clearing, installation of culverts, backfilling, and grading would cause temporary turbidity and sedimentation in the stream crossing area and immediately downstream from the crossing. Larger particles would settle faster than smaller particles, and fish would likely avoid the disturbed area. However, increased turbidity can affect the foraging behavior of fish, such as by increasing the time spent foraging and decreasing total prey consumption (Swanbrow Becker et al. 2016). Increased turbidity can lower dissolved oxygen levels, potentially causing loss of fish eggs and larvae and non-mobile invertebrates. Increases in siltation can damage fish gill membranes, destroy eggs of aquatic species, and degrade spawning and nursery areas (USFWS 2013). The downstream effect of turbidity would depend on the stream velocity and degree of disturbance at the time of construction.

Installation of the collection system using HDD at waterway crossings carries the potential of an inadvertent release of drilling mud into the waterway. Water-based drilling muds are composed of clay (e.g., bentonite), a weighting agent (usually barite), and various additives as necessary to facilitate drilling (EPA 1984). These muds can fully degrade and are considered to have very low toxicity. Effects of drilling mud on aquatic biological resources are caused mainly by burial and low oxygen concentrations. In the unlikely event of an inadvertent release, the drilling mud could affect fish and other aquatic resources by causing turbidity, temporarily coating the stream bed with a layer of clay, and potentially affecting fish gills, eggs, and/or larvae. However, fish would likely move away from a release area to avoid direct contact with drilling mud. The risk of an inadvertent release of HDD drilling mud is expected to be low. An inadvertent release of drilling mud/fluid would require site cleanup in accordance with the Project Horizontal Directional Drill (HDD) Inadvertent Release Control and Mitigation Plan (Appendix G).

While there could be potential short-term impacts to fisheries and aquatic resources as a result of construction runoff and sedimentation, the Proposed Action also could have a beneficial long-term effect on total phosphorus and suspended solids in the unnamed tributaries to the Crawfish River as a result of the land use conversion from agricultural crops to solar array.

Wetland and stream impacts would be permitted under applicable Federal and state requirements and construction would be carried out in accordance with the Project's CWA Section 404 permit and WDNR Section 401 Water Quality Certification. Construction would be carried out in accordance with the WPDES Stormwater/Runoff Permit, the Project's SWPPP and applicable BMPs (including silt fences, soil stabilization, construction matting, hand clearing vegetation, and other measures) would be used. Impacts on fisheries and aquatic resources are expected to be direct and indirect, adverse and beneficial, short-term and long-term, and minor given the relatively small extent, size, and number of the waterways that would be affected and the potential for drilling mud to dilute and disperse in the water column. Adverse impacts to fisheries and aquatic resources would primarily result from construction activities which would be short-term. Adverse impacts on fisheries and aquatic resources during operation of the solar facility would not be expected. Impacts from decommissioning are expected to be similar to those from construction activities.

3.5.5 Special Status Species

This section describes special status species with a focus on Federal- and state-listed threatened and endangered animal and plant species. No special status species have been detected to be present at or near the Project site.

3.5.5.1 Affected Environment – Special Status Species

Federally-Listed Species

The Endangered Species Act of 1973 (16 U.S.C. *et seq*.) affords legal protection to those species and their habitats that have met specified criteria for listing by the Federal government as either threatened or endangered. Section 3 of the Endangered Species Act defines endangered species as "any species which is in danger of extinction throughout all or a significant portion of its range..." and threatened species as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (Endangered Species Act, 16 U.S.C. *et seq*.). If a Federal agency undertakes an activity that may impact an "endangered" or "threatened" species, they must first consult with the USFWS or National Oceanic and Atmospheric Administration Fisheries, or both, according to Section 7 of the Endangered Species Act. An effect determination is made for each listed species and designated critical habitat according to the following determinations (USFWS 2021b):

- *No Effect* –"there will be no impacts, positive or negative, to listed species or proposed resources. Generally, this means no listed resources will be exposed to the action and its environmental consequences."
- *May Affect, But Not Likely to Adversely Affect* – "all effects are beneficial, insignificant, or discountable." Beneficial effects have "no adverse effects to the species or habitat." Insignificant effects are those that "relate to the size of the impact, including undetectable, not measurable, or cannot be evaluated." Discountable effects are those that are "extremely unlikely to occur."
- *May Affect, And Likely to Adversely Affect* – "listed resources are likely to be exposed to the action or its environmental consequences and will respond in a negative manner to the exposure". This would result in short- or long-term negative impacts.

Species with a Federal- or state-listing status and other protected species with recorded occurrences in the vicinity of the Project site were identified based on desktop research. The USFWS Information for Planning and Consultation (IPaC) database was used to identify species with Federal-listing status and the potential for critical habitats to occur on or in the vicinity of the Project site (Appendix J). There are no critical habitats within the Project site. The Federally-listed species which have the potential to be in proximity to the Project site include the northern long-eared bat (*Myotis septentrionalis*), whooping crane (*Grus americana*), and Eastern prairie fringed orchid (*Platanthera leucophaea*) (Table 3.5-11).

The Bald and Golden Eagle Protection Act prohibits the taking of bald or golden eagles, their parts, nests, and eggs. Taking is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" these species (USFWS 2018). All migratory birds are protected by the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703–712; 40 Stat. 755 as amended), which prohibits the taking of any migratory bird without authorization from USFWS. The MBTA states that "unless and except as permitted by regulations…it shall be unlawful at any time, by any means or in any manner, to take, capture, kill, possess…any migratory bird, any part, nest, or eggs of any such bird."

Table 3.5-11. Special Status Species Potentially Occurring in the Vicinity of the Project Site

Scientific Name	Common Name	Federal Status	State Status	Habitat
Mammals				
Myotis septentrionalis	Northern long-eared bat	Threatened	Threatened	In summer, roosts underneath bark, in cavities or in crevices of live trees and snags. Hibernate in caves and mines during winter.[1]

Scientific Name	Common Name	Federal Status	State Status	Habitat
Birds				
Chlidonias niger	Black tern	Not Listed	Endangered	Inhabits freshwater marshes and lakes. Nests in inland marshes, ponds, mouths of rivers and shores of large lakes.[2]
Grus americana	Whooping crane	Endangered	Not Listed	Nest in salt marshes and poorly drained areas interspersed with wetlands. Also forage in upland areas.[3]
Insects				
Danaus plexippus	Monarch butterfly	Candidate	Not Listed	Widespread in North America; migrates south to overwintering sites in Mexico. Feeds on nectar from flowers.[4]
Plants				
Platanthera leucophaea	Eastern prairie fringed orchid	Threatened	Endangered	Occurs in wide variety of habitats from mesic prairie to wetlands such as sedge meadows, marsh edges and bogs.[5]

[1] (USFWS 2015)
[2] (USFWS n.d.)
[3] (USFWS 2019)
[4] (USFWS 2021c)
[5] (USFWS 2005)

The migratory birds with the potential to occur on or near the Project site are American bittern (*Botaurus lentiginosus*), bald eagle (*Haliaeetus leucocephalus*), black tern (*Chlidonias niger*), black-billed cuckoo (*Coccyzus erythropthalmus*), least bittern (*Ixobrychus exilis*), lesser yellowlegs (*Tringa flavipes),* red-headed woodpecker (*Melanerpes erythrocephalus*), rusty blackbird (*Euphagus carolinus*), short-billed dowitcher (*Limnodromus griseus*), and willow flycatcher (*Empidonax traillii)* (Appendix J) (USFWS 2021a).

Northern long-eared bat

The threatened northern long-eared bat is a medium-sized bat with body size ranging from 3 to 3.7 inches with a wingspan of up to 10 inches. Its fur color is medium to dark brown on its back and pale brown on its underside. They are easily distinguished by their long ears. Emerging at dusk to feed, they fly through the understory of forested areas feeding on moths, flies, leafhoppers, caddisflies, and beetles.

This bat generally is associated with old-growth forests composed of trees 100 years old or older. During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Males and non-reproductive females may roost in cooler areas, like mines or caves. Northern long-eared bats spend winter hibernating in caves and mines (hibernacula). Typically, the hibernacula have large passages and entrances, constant temperatures, high humidity, and no air currents (USFWS 2015). The northern long-eared bat is a generalist in roost selection. Any tree greater than three inches diameter at breast

height may be used as a roost; therefore, any forested areas within the Project site may support northern long-eared bat populations.

The northern long-eared bat 4(d) rule prohibits incidental take that may occur from tree removal activities within 150 feet of a known occupied maternity roost tree during the pup season (June 1 to July 31) or within 0.25 mile of a hibernation site, year round. Winter tree removal may be acceptable for some projects, to be determined by the USFWS. USFWS concurred that the Proposed Action is consistent with activities analyzed in the Programmatic Biological Opinion for the northern long-eared bat. USFWS recommended helping to ensure that bat habitat is adequately protected by minimizing the removal of forested habitat and protecting forested hedgerows or other forested corridors connecting areas of suitable bat habitat. If impacts to bats cannot be avoided, an incidental take permit would be required. If any trees within the Project site are planned to be removed, WDNR recommended it would be beneficial to conduct tree removal outside of the summer avoidance period of June 1 through August 15, depending on assessment of the likelihood of bat roosting in the Project area. USFWS recommended that the spring and summer roosting periods (March 15 through August 15) be avoided. If removal cannot be avoided during these periods, surveys may be required to confirm species presence and other mitigation may also be required.

Black tern

The Wisconsin-endangered Black tern is a slender, semi-colonial waterbird with long pointed wings, a black head and breast and light under-wings (USFWS n.d.). They are often associated with coastal environments but can be found inland in freshwater marshes and lakes. They forage by picking insects from the water’s surface and while in flight (WDNR 2021b).

Whooping crane

The Federally-listed whooping crane is the tallest American bird at 5 feet (1.5 meters). It is snowy white with long neck and legs. Adults have a red crown and a patch of black feathers below the eye. The whooping crane travels between its summer habitat in central Canada and wintering grounds on the Texas coast in the spring and fall of each year. Food includes insects, frogs, small birds, rodents, minnows, and waste grains (USFWS 2011).

Winter habitat includes salt flats and upland forest, while nesting grounds consist of wetland communities (USFS 2021). Whooping cranes typically use shallow wetlands, marshes, the margins of ponds and lakes, sandbars, shorelines of shallow rivers, wet prairies and crop fields near water (ODWC 2021). The WDNR, along with other members of the Whooping Crane Eastern Partnership, is working to restore an eastern migratory population of whooping cranes that migrates annually between its Wisconsin breeding grounds and its wintering habitat in the southern United States (WDNR 2020d).

Monarch butterfly

The monarch butterfly currently is a candidate for Federal listing, but has not been proposed to date. There are generally no Section 7 requirements for candidate species, however all agencies are encouraged to consider conservation of the species (USFWS 2021c).

Monarch butterflies are large and conspicuous, with bright orange wings covered with black veins and surrounded by a black border with a double row of white spots, present on the upper side of the wings. This species breeds in North America and winters in Mexico. Eggs are laid on an obligate milkweed host on which the larvae feed. Adults feed on nectar from flowers where habitat is present (USFWS 2021c).

Eastern prairie fringed orchid

The threatened Eastern prairie fringed orchid is a perennial herb that grows from an underground tuber. Plants are 8 to 40 inches tall and have an upright leafy stem with a cluster of fringed white flowers. Flowering lasts for 7 to 10 days between late June and early July. Flowers are nocturnally fragrant and white because they are pollinated by night-flying hawkmoths. Seed capsules mature over the growing season and are dispersed by the wind from late August through September (USFWS 2005).

Preferred habitat for the orchid includes mesic prairie (moderate or well-balanced moisture) and wetlands such as sedge meadows, marsh edges, and bogs with little or no woody encroachment so as to provide full sun for optimum growth and flowering. Because of a symbiotic relationship between the seed and soil fungi, the habitat also requires the presence of mycorrhizae for seedlings to become established. Mycorrhizae help the seeds assimilate nutrients in the soil (USFWS 2005).

Population decline was historically due to the loss of habitat from conversion of natural habitats to cropland and pasture and currently due to the loss of habitat from the drainage and development of wetlands, succession to woody vegetation, competition from invasive species, and over-collection (USFWS 2005).

Other Species of Potential Concern

The four species with a Federal-listing status in Table 3.5-11 are those with recorded occurrences or the potential to occur in the immediate vicinity of the Project site as identified using the USFWS IPaC database. The rusty patched bumblebee is listed as threatened by the USFWS, but did not appear in the IPaC search results. This species was mentioned as being of potential concern by the USFWS representative during the Interagency Scoping Meeting for the Project held on October 28, 2021. The context of the USFWS representative’s statement related to a concern that the Project site is close to designated High Potential Zones for the rusty patched bumblebee (see Figure 3.5-2). The Project site would be planted in vegetation that would provide beneficial pollinator habitat during operation of the proposed solar facility which could draw this species to the area and create a High Potential Zone.

The relationship of the Project site to Low and High Potential Zones is shown in Figure 3.5-2. The red areas are High Potential Zones where the rusty patched bumblebee is likely present. The yellow areas surrounding High Potential Zones indicate a Low Potential Zone representing primary dispersal zones for the species; Section 7 consultation and Incidental Take Permits are not needed in these areas. The closest High Potential Zone for the rusty patched bumblebee is more than 3 miles to the east of the Project site, although the Project site does lie within a mapped Low Potential Zone.
State-Listed Species

According to WDNR, State Statute 29.604, and Administrative Rule NR27, a Wisconsin state endangered species is any species which is valuable to the state's wild animal and plant populations and is determined to be at risk for loss, based on scientific evaluation (WDNR 2021p). A Wisconsin threatened species is any species which is at risk of becoming endangered based on scientific evaluation (WDNR 2021p). The state listed species of Wisconsin are also listed on the Federal Endangered and Threatened Species list or protected under the MBTA or the Bald and Golden Eagle Protection Act. Based on the USFWS IPaC list for the Project site, the Wisconsin state listed species which have the possibility of occurring on the Project site include the threatened northern long-eared bat (*Myotis septentrionalis*), the endangered black tern (*Chlidonias niger*), and the threatened Eastern prairie fringed orchid (*Platanthera leucophaea*) (WDNR 2021p). These species are discussed in the Federally-Listed Species subsection above.

3.5.5.2 Environmental Consequences – Special Status Species

This section describes potential impacts to special status species for the Proposed Action and No Action Alternatives.

No Action Alternative

Under the No Action Alternative, the RUS would not fund the proposed solar facility. No Project-related impacts to special status species would be expected to occur. Existing land use would remain primarily farmland, and effects on protected species would remain as they are at the present time. However, impacts to special status species could result due to the continuing use of the Project area as agricultural land should such species utilize the Project area.

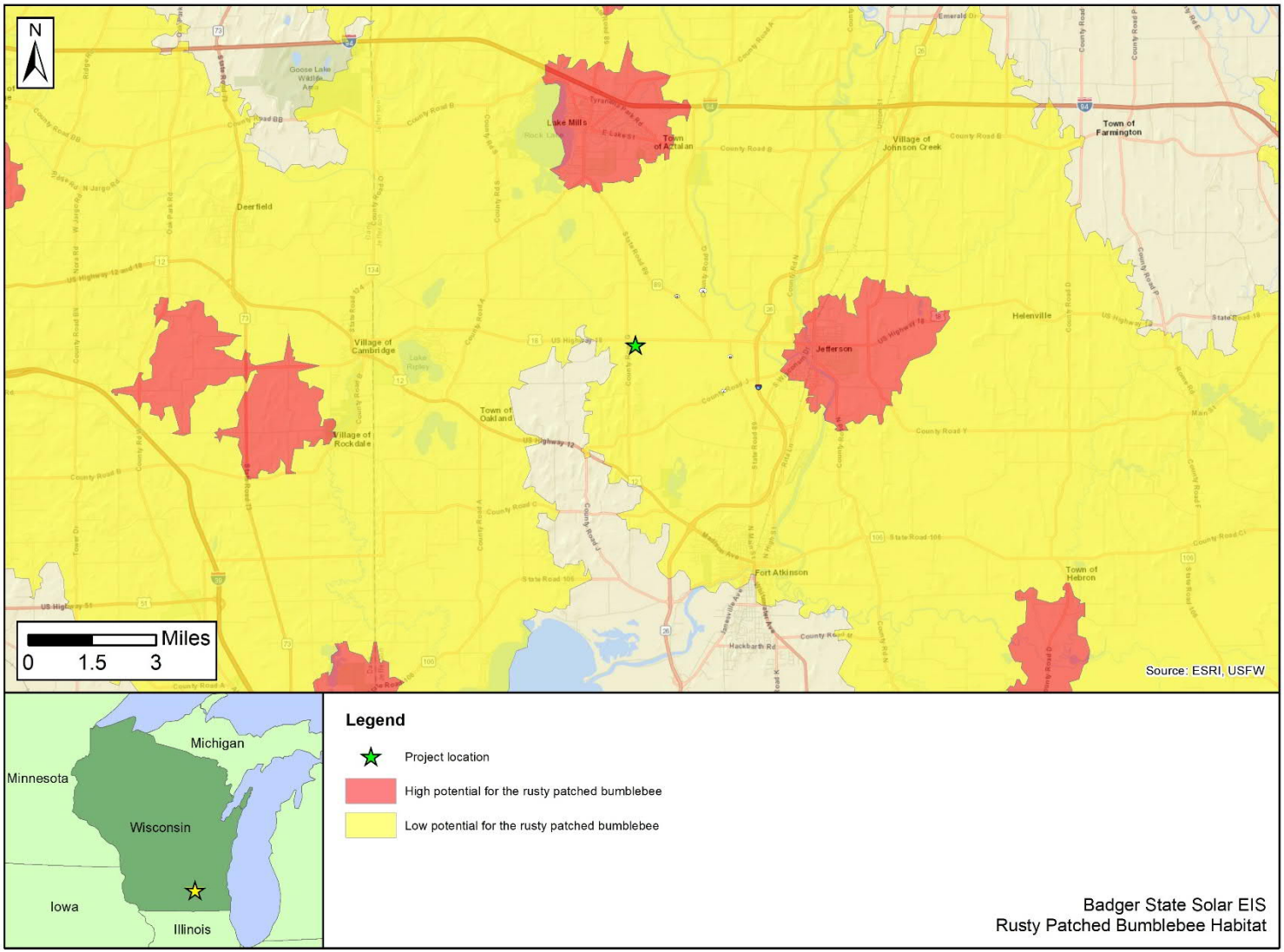

Figure 3.5-2. Rusty Patched Bumblebee Potential Habitat Zones

Proposed Action Alternative

As described in the Federally-Listed Species subsection above, two Federally threatened species are known or suspected to occur within the vicinity of the Project site, the Northern long-eared bat and the Eastern prairie fringed orchid. One non-essential experimental population of the Federally-endangered whooping crane has the potential for individuals to be present within the Project vicinity. The candidate species Monarch Butterfly could also be present within the Project site. One state endangered species, the Black tern, has the potential to be present within the Project site. Special status species are listed in Table 3.5-11. There is no critical habitat for these species within the Project site and critical habitat would not be impacted.

Bats and Birds

Impacts to the Northern long-eared bat are considered together with birds protected under the MBTA because the potential habitat for these species are similar within the Project areas. To the extent practicable, the Proposed Action has been designed to keep all site development activities confined to agricultural areas and to avoid higher quality habitats that are potentially more likely to support bat and bird species.

Potential impacts on birds from PV solar development include habitat loss and potential for collision mortality. However, little is known about precisely how many birds are being killed by operational solar energy facilities (ABC n.d.). Only two papers in the peer-reviewed literature present fatality information at a utility-scale PV solar facility (Kosciuch et al. 2020). Solar PV solar facilities can benefit birds and pollinators overall when native plant species are grown around PV panels (Smithson-Stanley and Bergstrom 2017).

Northern Long-eared Bat

The northern long-eared bat roosts in forested areas. Tree clearing in the Project area would involve up to 2.5 acres of clearing. This would include 0.46 acres of individual trees based on calculated crown area.

Ultimately, the total acreage of tree clearing is expected to be less than two acres. Badger State Solar consulted the WDNR Natural History Inventory database for current Long-eared bat roost sites and hibernacula in Wisconsin. The Project areas is more than 150-foot (45-meter) radius from a known maternity roost tree and more than 0.25 mile (0.4 km) from known hibernacula. The Project area is also more than a 150-foot (45-meter) radius from a known maternity roost tree and more than 0.25 miles (0.4 km) from known hibernacula. Therefore, incidental take is not prohibited (USFWS 2016).

Badger State Solar believes sufficient potential habitat would remain after tree-clearing activities have occurred and the Proposed Action would only result in incidental impacts to special status species. BMPs (such as soil stabilization, use of non-invasive species when reseeding, and adherence to herbicide application guidance) would be used around retained bodies of water to minimize the potential impacts of herbicides and

sedimentation. Additionally, Badger State Solar would avoid the spring and summer roosting periods (March 15 through August 15) to the extent possible. With the use of BMPs, avoidance of the higher-quality foraging habitat, similarly suitable foraging habitat in the surrounding landscape, and timing of project activities, the Project would have no measurable effect on foraging bats and birds. Impacts to bat and bird species from tree removal or habitat loss would be minimal.

On December 21, 2021, USFWS concurred that the Proposed Action is consistent with activities analyzed in the Programmatic Biological Opinion for the northern long-eared bat.

Whooping Crane

Whooping cranes currently exist in the wild at only three locations and in captivity at 12 locations, with total wild populations estimated at 383 individuals and captive populations of 152 individuals, as of 2010 (USFWS 2021d). Three non-essential experimental populations of whooping crane have been introduced throughout the US, one of which was initiated in 2001 that migrates between Wisconsin and Florida and is the population with the potential for species to occur in the Project area (USFWS 2021d). There is only one self-sustaining wild population; it nests in Wood Buffalo National Park in northern Alberta, Canada and winters in coastal marshes in Aransas, Texas. Whooping cranes breed and nest in shallow pothole wetland habitat in Wood-Buffalo National Park. During migration, whooping cranes use a variety of habitats; wetland mosaics appear to be the most suitable (USFWS 2021d).

There are no confirmed records of Whooping crane nests in Wisconsin (USFWS 2021d). Whooping cranes adhere to ancestral breeding areas, migration routes, and wintering locations, so expansion into new territory is unlikely. The only wild, self-sustaining breeding population is not expected to expand outside of its current nesting location (USFWS 2021d). Whooping cranes primarily feed in shallow, semi permanently flooded palustrine wetlands and roost in cropland and emergent wetlands (USFWS 2021d). The Proposed Action has been designed to avoid higher-quality foraging habitat, and similarly suitable foraging and roosting habitat exists in the surrounding landscape. As such, the Proposed Action is expected to have no measurable effect on migrating whooping cranes. On December 21, 2021, USFWS concurred that the Proposed Action may affect, but is not likely to adversely affect whopping crane. The USFWS concurred that Proposed Action minimization measures during constriction are expected to avoid or minimize disturbance to the whopping cranes and that minor loss of stopover and feeding habitat would not be likely to negatively impact the species (Appendix J).

Black Tern

The Black tern breeds in marshes, sloughs, rivers, lakeshores, and wet meadows, typically in sites with both emergent vegetation and open water. Cattails, bulrushes, bur-reed, and/or phragmites are the dominant plant species occurring in nesting areas (WDNR 2021b). The Black tern is listed as occurring in Wisconsin Natural Heritage

Inventory data. Data do not list this species nor wet-mesic prairie habitat for the township and range in which the Project area is located (WDNR 2020a). This species is often associated with coastal environments but can be found inland in freshwater marshes and lakes. Preferred habitat is large shallow marshes with abundant vegetation adjacent to open water (WDNR 2021b).

It is possible for bats and birds to collide with solar panels. The likelihood and significance of collisions resulting in injury or mortality during construction would likely be minor. Kosciuch, et. al (2020) synthesized results across 13 years for fatality monitoring studies at 10 PV solar facilities in California and Nevada. Distribution of avian taxonomic order and species varied among Bird Conservation Regions evaluated. Birds that rely on water take-off and landing were observed in 9 of 10 site-years; mortality cause could not be determined for approximately 61 percent of intact carcasses. The average annual mortality estimate was 2.49 birds per megawatt per year. Songbirds, pigeons, and doves had the highest number of fatality detections. The highest mortality detections occurred in the fall through winter. There was no evidence of large-scale mortality of nocturnal migrating passerines or water-dependent species. The study concluded that overall average annual mortality could not be generalized to Bird Conservation Regions where mortality studies have not been completed. Although the actual mortality from bat and bird collisions with solar panels is unknown without site-specific empirical data, direct impacts on bats and birds after the installation of solar facilities is anticipated to be insignificant.

Monarch Butterfly

The primary threats to the Monarch butterfly include loss and degradation of habitat form conversion of grasslands to agriculture and use of herbicides. Conservation efforts are underway in several states including Wisconsin. Although this species is not documented by WDNR as occurring in Jefferson County, it is likely present. The Project site is primarily agricultural with little suitable habitat available.

Eastern Prairie Fringed Orchid

The Eastern prairie fringed orchid is found in moist, undisturbed, deep-soiled and/or calcareous prairies (WDNR 2021c). This species is significantly associated with wet-mesic prairie within the Southeast Glacial Plain and weakly associated with the relict bogs in the Southern Lake Michigan Coastal landscape. Wisconsin Natural Heritage Inventory data do not list this species nor wet-mesic prairie habitat for the township and range in which the Project area is located (WDNR 2020a).

Other Species of Potential Concern

The Project site would be planted in vegetation that would provide beneficial pollinator habitat during operation of the proposed solar facility which could draw the rusty patched bumblebee to the area and create a High Potential Zone. With the removal of habitat and return to agricultural or other uses by the landowners following the end of the useful life of the facility and decommissioning of the site at the end of the lease period, there could be potentially adverse impacts on the rusty patched bumblebee.

During the Interagency Scoping Meeting, the USFWS representative questioned whether there was a plan in place following project decommissioning to either keep the Project site in vegetation that would continue to support the rusty patched bumblebee or to identify landowners who might be concerned about potential adverse effects and inform them of how they might help reduce potential adverse effects after the end of the lease period.

The useful life of the solar array facility is expected to be 35 to 40 years. Badger State Solar would have no control over the landowner's use of their properties after the leases expire, although voluntary conservation measures could be implemented by concerned landowners to mitigate this potential adverse effect. Therefore, there could be a potentially adverse impact to the rusty patched bumblebee should the Project site become a High Potential Zone.

Special Status Species Effect Determination

RUS determined that the Proposed Action may affect, but is not likely to adversely affect the Northern long-eared bat and the Whooping crane. The Proposed Action would have no effect on the Monarch butterfly and Eastern prairie fringed orchid or Black tern (Table 3.5-12). Depending upon various landowner uses of the land following decommissioning of the solar facility, there could be a potential adverse impact on the rusty patched bumblebee unless voluntary conservation measures are implemented by the landowners.

The Proposed Action would not impact designated critical habitats. Construction, operation, and decommissioning may directly or indirectly affect special status species, if present in the Project areas. For those species potentially present on the Project site effects are expected to be undetectable, not measurable, or extremely unlikely to occur, and implementation of the Proposed Action would not jeopardize the continued existence of these species.

RUS initiated informal consultation with the USFWS in a letter dated October 15, 2021. On December 21, USFWS concurred with the finding that the Proposed Action may affect, but is not likely to adversely affect listed or proposed species or designated critical habitat (Appendix J). The USFWS also provided guidance on National Bald Eagle Management Guidelines and incidental take permits, recommendations for site selection and layout, and recommendations for project construction. In the December concurrence, USFWS also provided the following recommendations:

- Identify bald eagle nests that are within or near the Project site to inform project layout. If the Proposed Action may impact a bald eagle nest, or unavoidably disturb bald eagles, contact the USFWS regarding the Eagle Act permit process.
- Help to ensure that bat habitat is adequately protected by minimizing the removal of forested habitat and protecting forested hedgerows or other forested corridors connecting areas of suitable bat habitat.

Table 3.5-12. Protected Species Effect Determination

Species	Critical Habitat	Federal Status	State Status	Notes	Endangered Species Act Determination
Mammals					
Northern long-eared bat (*Myotis septentrionalis*)	None	Threatened	Threatened	The Project Areas are more than 150-foot (45-meter) radius from a known maternity roost tree and more than 0.25 miles (0.4 km) from known hibernacula.	May affect, not likely to adversely affect
Birds					
Black tern (*Chlidonias niger*)	NA	Not Listed	Endangered	No suitable habitat. There are no large, shallow marshes with abundant vegetation adjacent to open water within the Project area.	NA
Whooping crane (*Grus americana*)	Final, none present	Endangered (EXPN1)	Not Listed	Nesting habitat (pothole wetlands in Canada) is not present within the Project areas. The feeding and roosting habitat (palustrine, emergent wetlands and croplands) is present within the Project areas and would be temporarily disturbed by noise and human activity, but conservation measures during construction are expected to avoid or minimize disturbance or injury. There would be minor loss of stopover and feeding habitat, but abundant suitable habitat is available nearby.	May affect, not likely to adversely affect
Insects					
Monarch butterfly Danaus plexippus	None	Candidate	Not Listed	No suitable habitat. The Project site is primarily agricultural and does not provide the wildflower habitat and milkweed to support this species.	No effect
Plants					
Eastern prairie fringed orchid (*Platanthera leucophaea*)	None	Threatened	Endangered	No suitable habitat. The Project site does not contain the high-quality wetlands that have potential to support this species.	No effect

[1] A population that has been established within its historical range under Endangered Species Act Section 10(j) to aid recovery of the species. Non-essential experimental population being introduced to summer and breed in central Wisconsin.

- For federally listed species, plan to avoid impacts to suitable habitat. If habitat impacts cannot be avoided, conduct appropriate surveys to confirm species presence.
- Plan the site to provide habitat for pollinators, including a water source (e.g. ephemeral pool or low area to provide additional resources for pollinators and bats.
- When removing wildlife habitat, avoid spring and summer (March 15-August 15 when feasible).
- Consider voluntary mitigation to offset the loss of forested areas, wetlands, or native grasslands.
- Use construction techniques and materials (wildlife friendly erosion control materials) that are unlikely to cause additional harm to wildlife.
- Implement measures to reduce the chances that equipment will exacerbate the spread of invasive species into natural habitats (e.g., cleaning equipment prior to accessing the site, post-site restoration monitoring, and invasive plant treatments, as necessary).
- Select a site with the least wildlife value practicable. If low wildlife sites are not feasible, avoid or minimize to the greatest degree practicable the conversion of forest areas, native grasslands, and wetlands.

Badger State Solar will comply with the majority of the recommendations. Regarding the final recommendation to select a site with the least wildlife value practicable, environmental constraints such as presence of trees, critical habitat, and endangered species was a factor considered during the site selection process described in Sections 2.1.2 and 2.2. Therefore, this recommendation was previously addressed as part of the identification of the Project site in Jefferson County.

3.6 Land Resources

This section describes an overview of the existing land use at and surrounding the Project site and potential impacts to land use associated with the Proposed Action and No Action Alternative. The Proposed Action is located on a site in the Townships of Jefferson and Oakland, west of the City of Jefferson, in Jefferson County, Wisconsin (Figure 1.1-1). The site is crossed from east to west by US 18, bordered on the northeast by State Highway 89, and bisected north-south by County Road J.

3.6.1 Affected Environment – Land Resources

3.6.1.1 Land Use and Zoning

Land use is defined as the way people use and develop land, including categories such as undeveloped, agricultural, residential, and industrial. Many municipalities develop

zoning ordinances and planning documents to control the direction of development and to keep similar land uses together. The Proposed Action would be located on the north and south sides of US 18, approximately 2 miles west of State Highway 89. The Proposed Action would be located approximately 2 miles west of the City of Jefferson. Zoning and land use permit requirements are currently available for Jefferson County (Jefferson County Wisconsin 2021b).

The Project site is mostly agricultural land with scattered residences and actively farmed and small shrubby and forested areas present. The regional character is mostly rural, with agricultural fields, forested areas, and generally small towns. Figure 3.6-1 and Table 3.6-1 present the results of a combined aerial photography and direct field observation analysis conducted by Badger State Solar in the summer of 2018. Figure 3.6-2 and Table 3.6-2 present the 2019 National Land Cover Database (NCLD) classifications for the land cover within the Project site. While there are some differences in the classification of land cover, both analyses demonstrate that a majority of the site is agricultural in current land use (Badger State Solar 2019b).

Table 3.6-1. 2018 Badger State Solar Land Cover Classifications

Land Cover Classification	Total Land Cover	Primary Project Area
Agriculture		
Row Crops	1258.9	926.8
Hay/Pasture/Old field	7.9	7.1
Other Agriculture	363.2	189.4
Non-Agricultural Upland		
Prairie/Grassland	7.1	6.8
Upland Woods	56.6	30.3

Source: (Badger State Solar 2019b)

Table 3.6-2. 2019 National Land Cover Database Classifications at the Project Site

2019 NLCD Land Cover Class	Acreage on Project Site
Developed, Open Space	4.74
Developed, Low Intensity	15.66
Developed, Medium Intensity	0.96
Deciduous Forest	7.24
Evergreen Forest	1.84
Hay / Pasture	9.61
Cultivated Crops	1130.73
Woody Wetlands	7.38
Emergent Herbaceous Wetlands	21.58
Total	1199.74

Source: (MRLC).

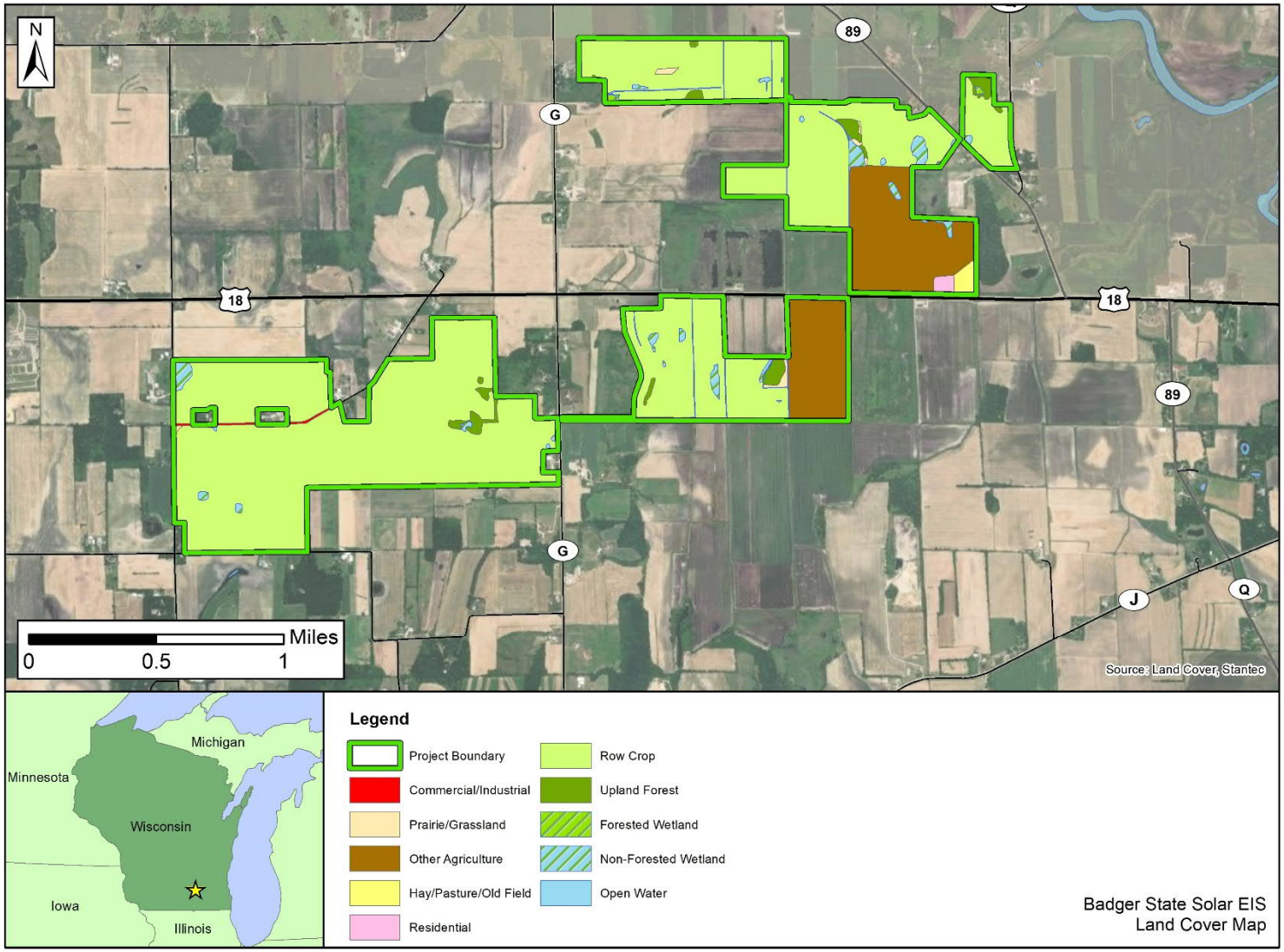

Figure 3.6-1. Badger State Solar 2018 Land Cover Map

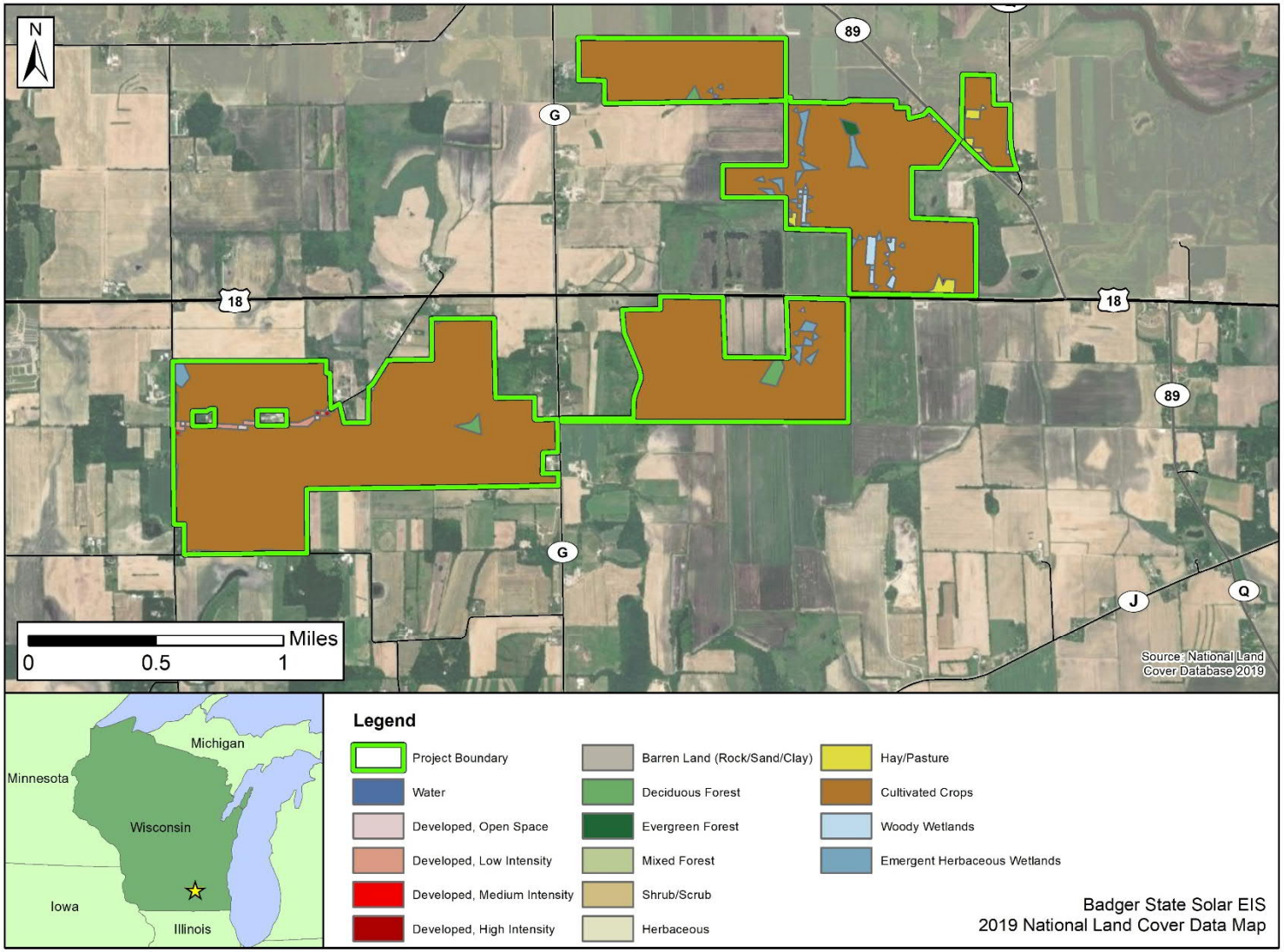

Figure 3.6-2. Badger State Solar 2019 National Land Cover Database Map

Crops predominantly grown within the Project boundary include corn, soybean, hay/silage, mint, and wheat. Crops, with the exception of mint, are generally rotated according to agricultural practices for the area. Because most of the Project land is flat, plow lines typically parallel the longest dimension of the field. Access roads are often located along an existing farm road or along field edges, providing more convenient and reliable access to distant fields.

The closest active landfill to the Project site is Waste Management Deer Track Park Landfill in Watertown, Wisconsin (Jefferson County) approximately 9 miles northeast of the Project site. Solid waste in Jefferson County is managed by the Jefferson County Courthouse (Jefferson County Wisconsin 2021c).

3.6.1.2 Prime and Important Farmlands

Prime farmland is land most suitable for economically producing sustained high yields of food, feed, fiber, forage, and oilseed crops. Prime farmlands are available for agricultural use, i.e., not water or urban built-up land, and have the best combination of soil type, growing season, and moisture supply. Although not Federally recognized as prime farmland, managed farmland of statewide importance regionally produces yields of food, feed, fiber, forage, and oil seed crops. Individual states delineate their own important farmland (NRCS 2021a). Table 3.6-3 and Figure 3.6-3 present the soils present on the Project site that are classified as prime farmland or farmland of statewide importance.

Table 3.6-3. Prime Farmland Soil Type Occurrence on the Project Site

Map Unit Symbol	Soil Type	Prime Farmland?	Acreage on Project Site
AzA	Aztalan fine sandy loam, 0 to 3 percent slopes	Prime farmland if drained	3.79
CaB2	Casco loam, 2 to 6 percent slopes, eroded	Farmland of statewide importance	1.03
DdB	Dodge silt loam, 2 to 6 percent slopes	All areas are prime farmland	24.98
Ev	Elvers silt loam	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	13.44
FoC2	Fox loam, 6 to 12 percent slopes, eroded	Farmland of statewide importance	56.88
FsA	Fox silt loam, 0 to 2 percent slopes	All areas are prime farmland	20.02
FsB	Fox silt loam, 2 to 6 percent slopes	All areas are prime farmland	193.37
Ht	Houghton muck, 0 to 2 percent slopes	Farmland of statewide importance	126.63
JuB	Juneau silt loam, 1 to 6 percent slopes	All areas are prime farmland	3.73
Kb	Keowns silt loam, 0 to 2 percent slopes	Prime farmland if drained	18.24
KdA	Kibbie fine sandy loam, 0 to 3 percent slopes	All areas are prime farmland	15.35

Map Unit Symbol	Soil Type	Prime Farmland?	Acreage on Project Site
KfB	Kidder loam, 2 to 6 percent slopes	All areas are prime farmland	6.35
KfC2	Kidder loam, 6 to 12 percent slopes, eroded	Farmland of statewide importance	71.77
KgB	Kidder loam, moderately well-drained, 2 to 6 percent slopes	All areas are prime farmland	0.43
MmA	Matherton silt loam, 0 to 3 percent slopes	Prime farmland if drained	9.37
MpB	McHenry silt loam, 2 to 6 percent slopes	All areas are prime farmland	42.71
MpC2	McHenry silt loam, 6 to 12 percent slopes, eroded	Farmland of statewide importance	30.73
Ot	Otter silt loam	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	1.52
RaA	Radford silt loam, 0 to 3 percent slopes	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	11.28
SbA	St. Charles silt loam, moderately well drained, 0 to 2 percent slopes	All areas are prime farmland	21.15
SbB	St. Charles silt loam, moderately well-drained, 2 to 6 percent slopes	All areas are prime farmland	12.36
SfB	St. Charles silt loam, moderately well-drained, gravelly substratum, 2 to 6 percent slopes	All areas are prime farmland	163.14
ShB	Salter loamy sand, 2 to 6 percent slopes	All areas are prime farmland	6.63
Sm	Sebewa silt loam, 0 to 2 percent slopes	Prime farmland if drained	19.17
SoB	Sisson fine sandy loam, 2 to 6 percent slopes	All areas are prime farmland	10.74
VwA	Virgil silt loam, gravelly substratum, 0 to 3 percent slopes	Prime farmland if drained	7.80
Wa	Wacousta silty clay loam, 0 to 2 percent slopes	Prime farmland if drained	10.75
WmA	Wasepi sandy loam, 0 to 3 percent slopes	Prime farmland if drained	9.64
WvA	Wauconda silt loam, 0 to 2 percent slopes	Prime farmland if drained	3.24
WvB	Wauconda silt loam, 2 to 6 percent slopes	Prime farmland if drained	0.36
Total			**916.59**

Note: These numbers are rounded and are approximate

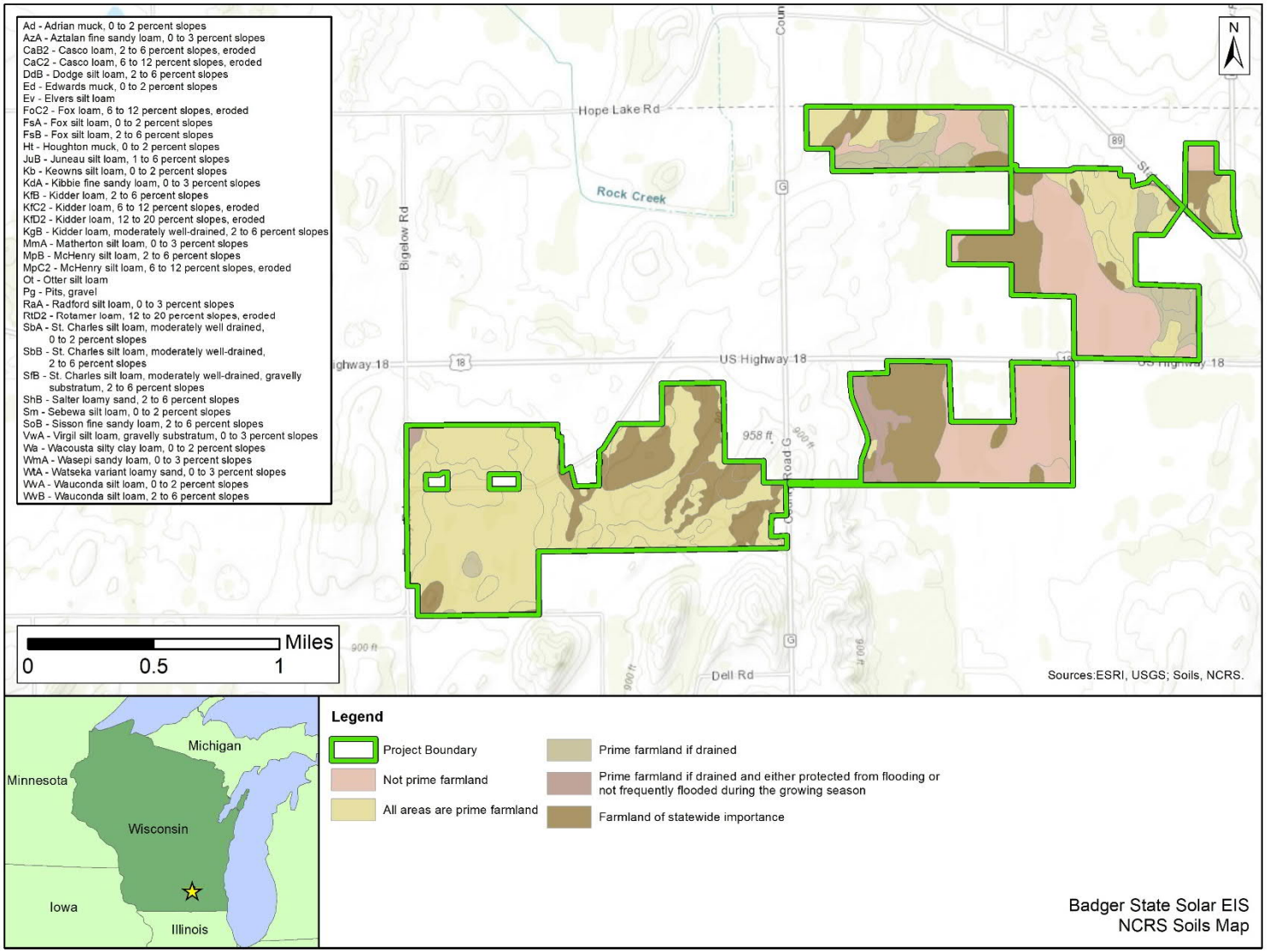

Figure 3.6-3. Badger State Solar NCRS Soils Map

Table 3.6-4 provides a summary of farming in Jefferson County and in the state of Wisconsin for comparison. Changes in the number and acreage of farms from 2012 to 2017 are also included (USDA 2017b).

Table 3.6-4. 2017 Farming Statistics for Jefferson County, Wisconsin

	Number of Farms	Percentage of Total Area in Farms (%)	Land in Farms (acres)	Change from 2012 to 2017	
				Number of Farms	Land in Farms (acres)
Jefferson County	1,098	62.2	221,355	-127	-6,546
Wisconsin	64,793	41.3	14,318,630	-4,961	-250,296

Source: (USDA 2017b)

3.6.1.3 Formally Classified Lands

Formally classified lands are properties that are administered either by Federal, state, or local agencies, or have been given special protection through formal legislative designation. Formally classified lands can include public lands, wildlife management areas, habitat protection areas, ecologically significant sites, and other special uses. The following resources were reviewed to assess the presence of formally classified lands in and around Project area: the USGS Protected Areas Database of the United States, agency databases, and the internet (i.e. Google Earth, Google Maps). In addition to public lands, certain private properties can be enrolled in state land management programs (such as Managed Forest Law). Certain types of formally classified lands may allow public access for activities such as hunting and fishing.

There are numerous national, state, and local parks in the area. The parks are listed in detail in Section 3.6.4. Figure 3.6-4 shows Federal, state, county and local properties within 2 miles of the Project area.

<u>Federal Properties including: Wildlife Refuges, Parks and Scenic Riverways</u>

There are no Federally-owned properties such as wildlife refuges, parks or scenic river ways located within 2 miles of the Project area.

Seven USDA Natural Resources Conservation Service (NRCS) Wetlands Reserve Program (WRP)[1] (NRCS 2021b) parcels are located within 2 miles of the Project area (see Figure 3.6-4). Four of these are immediately adjacent to the Project area. Two are located approximately 0.75 miles west of the Project area. One is located approximately 0.80 miles northwest of the Project area.

[1] The Agricultural Act of 2014 established the Agricultural Conservation Easement Program and repealed the WRP. However, the repeal does not affect the validity or terms of any WRP contract, agreement, or easement entered into prior to February 7, 2014. It also does not affect any associated payments required to be made in connection with an existing WRP contract, agreement, or easement.

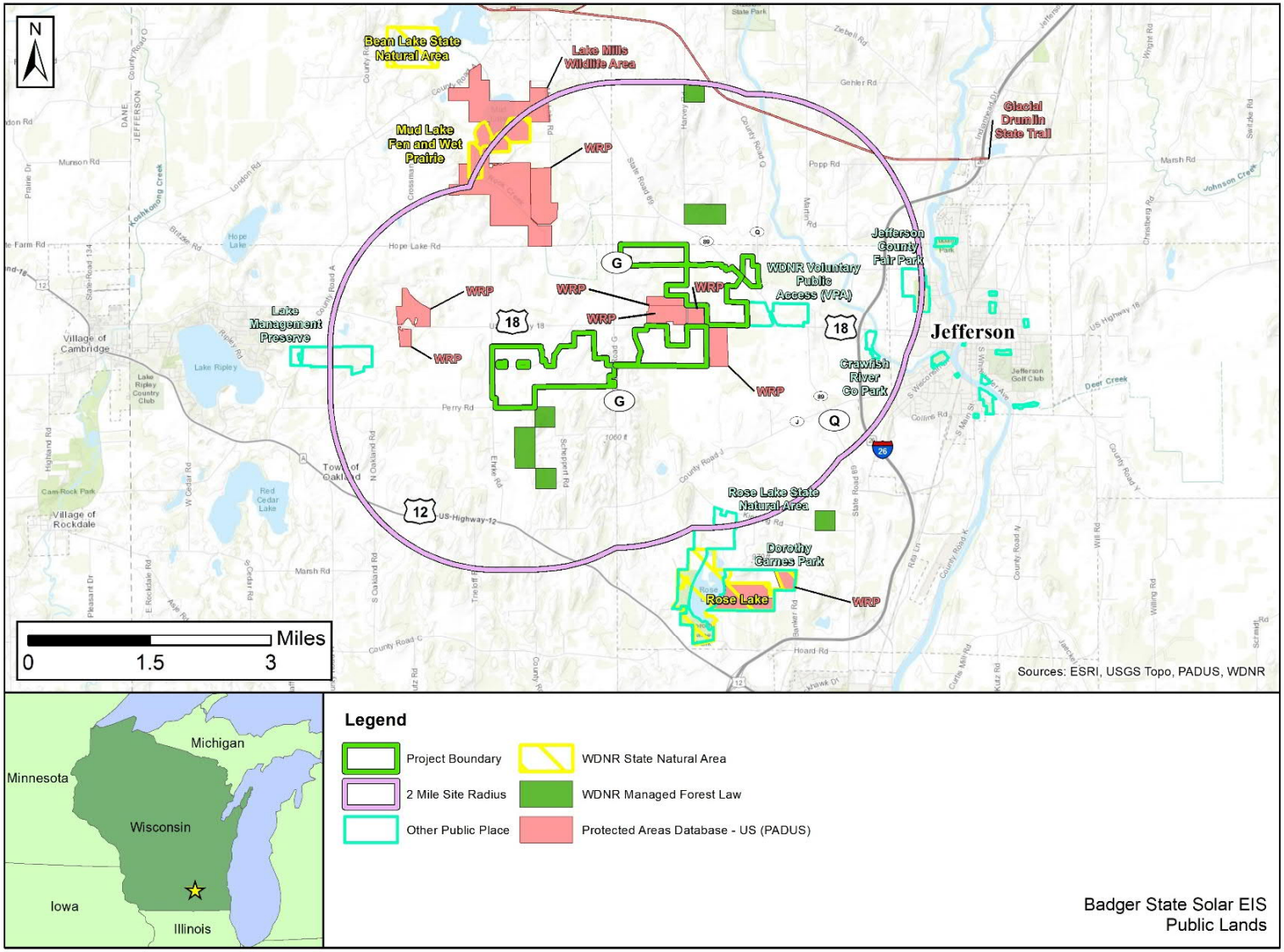

Figure 3.6-4. Badger State Solar Public Lands

The NRCS WRP is a voluntary program that provides assistance to private landowners to restore, protect, and enhance wetlands(NRCS 2021b). Specific details are not available; however, it is assumed that each WRP parcel has individual management plans established between the NRCS and the landowner.

The Proposed Action will be visible from the WRP land located adjacent to the Project area adjacent to US 18. The Proposed Action will likely not be visible from the remaining properties due to distance, topography, and tree cover.

State Properties including: Wildlife Areas, Fisheries Areas, and State Parks

In Wisconsin, state natural areas are designated to protect various outstanding native landscapes, natural communities, geological formations, and archaeological sites. No state properties are located within the Project area. Four state owned or managed properties are located within 2 miles of the Proposed Action (Figure 3.6-4). The Project will likely not be visible from any of these locations due to distance, topography, and tree cover.

Rose Lake is a shallow, hard water seepage lake located approximately 1.7 miles south of the Project area. The lake is surrounded by wetlands, oak openings (a dry oak savanna and prairie grassland area), and steep hills. The natural area provides habitat for a variety of fauna (WDNR 2021n).

Mud Lake Fen and Wet Prairie State Natural Area, located approximately 1.7 miles northwest of the Project area on the south shore of Mud Lake, supports a diverse flora and fauna. The natural area includes a narrow band of calcareous fen adjacent to the Mud Lake inlet stream (WDNR 2021h). Fens are a type of peat-forming wetland that rely on groundwater and develop gradually over thousands of years (USDA 2021).

The Lake Mills Wildlife Area, located approximately 0.8 miles west of the Project area, includes approximately 3,300 acres of diverse habitat including open water marsh, large areas of wet prairie, lowland hardwoods with tamarack and some oak savanna uplands (WDNR 2021e).

The Lake District Prairie Preserve is located 1.40 miles west of the Project area. This preserve is 167 acres in size and was created to help protect the only inlet tributary to Lake Ripley.

Additionally, five WDNR Managed Forest Law parcels are located within 2 miles of the Project area as shown on Figure 3.6-4. The WDNR Managed Forest Law program is a landowner incentive program that encourages sustainable forestry on private woodland, these areas must be managed in accordance with a plan agreed to by the landowner (WDNR 2021g).

3.6.1.4 Recreation

Natural areas include Federally-protected and managed areas such as Wildlife Management Areas, National Wildlife Refuges, and Habitat Protection Areas, ecologically significant sites, and river segments listed in the Nationwide Rivers Inventory. Recreation areas provide recreational activities and opportunities to the public at the Federal, state, or local level. There are numerous national, state, and local parks as well as lakes and rivers of various sizes in the state of Wisconsin. This analysis focused on locations 5 miles or less from the Project site. Since the land parcels that make up the Project site are privately-owned and consist primarily of agricultural lands, there are no natural areas or recreation areas within the Project boundary. There are no wild and scenic river systems located within 100 miles of the Project site.

National Parks

There are no national parks, landmarks, or monuments within 5 miles of the Project site.

State Parks

The natural areas and parks described in Section 3.6.1.3 may also be used for recreational activities such as boating, hiking, bird-watching, etc. Additional state recreational areas are described below.

The Glacial Drumlin State Trail is a 52-mile long bicycle trail that runs between Cottage Grove and the Fox River Sanctuary in Waukesha Wisconsin. A portion of this trail is located approximately 1.9 miles north of the Project area.

Aztalan State Park is 5 miles north of the Project site. This is a 172-acre park located along the Crawfish River and shows a Mississippian village and ceremonial complex that was in the area from around 1000-1300 AD (Travel Wisconsin 2021a).

The Bean Lake State Natural Area is also located within the Lake Mills Wildlife Area. The Bean Lake State Natural Area includes a 33 acre alkaline seepage lake. The lake is surrounded by tamarack and shrub swamp. The area provides habitat for a variety of species (WDNR 2021a).

County and Local Parks and Other Recreational Areas

There are no county or local properties located within the Project area. Two county parks and one local property are located within 2 miles of the Project area (see Figure 3.6-4).

Crawfish River County Park is located 1.5 miles east of the Project area and is currently in the planning stages and would be located along the Crawfish River (Jefferson County Wisconsin 2021a).

Jefferson County Fair Park is located 1.8 miles east of the Project area. This park is managed by the county and was established in 1852. It hosts county fairs, auctions, flea markets, animal events, community events, and provides winter storage for residents (boats, RV's etc.) (Jefferson County Fair Park 2021).

Sandhill Station Campground is a 15 site campground located on Mud Lake about 4 miles northwest of the Project site (Travel Wisconsin 2021b).

3.6.2 Environmental Consequences – Land Resources

This section describes the potential impacts to land resources should the Action or No Action Alternatives be implemented.

3.6.2.1 No Action Alternative

Under the No Action Alternative, RUS would not fund the Proposed Action. No Project-related impacts to land resources would be expected to occur.

3.6.2.2 Proposed Action Alternative

Land Use and Zoning

Under the Proposed Action, impacts to land resources would be expected on the Project site. The Project site would convert from a primarily agricultural land use, to primarily a solar facility. Land cover would change from primarily agricultural crops to the industrial cover of solar panels and cover vegetation.

The surrounding area is largely agricultural and undeveloped with some low-density residential and industrial development, and the surrounding land use is not likely to change significantly over the next 40 years. As a relatively small portion of a very large land use category in the vicinity would be lost, and only for the course of the project lifetime, the Proposed Action would have an overall minor, long-term, adverse impact on land use. Decommissioning of the solar facility would remove aboveground equipment, concrete pads and foundations, pilings, and below ground electrical connections from the Project site. Some underground utilities may be abandoned in place. Reclamation activities, including breaking up soil in compacted areas, could allow the majority of the Project site to be returned to agricultural use. The activities associated with the Proposed Action would not have any indirect effects on land use.

Prime Farmland

The Farmland Protection Policy Act (FPPA) (7 U.S.C. Part 4201 *et seq.*), requires Federal agencies to consider the adverse effects of their actions on prime or unique farmlands. The purpose of the Act is "to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses." Should the Proposed Action be implemented, approximately 916.59 acres of prime farmland on the Project site would be converted to nonagricultural use, precluding

farming for the duration of site operations. The approximately 1,750-acre site received a rating of 159 while the approximately 1,200-acre site received a rating of 166 on the AD 1006 Farmland Conversion Form exceeding the impact threshold of 160. The acreages of prime farmland and farmland of state importance that would be impacted by the Proposed Action is shown in Table 3.6-3. Activities within the Project area of permanent disturbance would result in the loss of some farmland soils through grading and excavation activities; however, the majority of onsite soils would remain in place. During operations, soils would have an opportunity to develop in place with minimal ground disturbance.

To quantify the potential impacts on prime farmland soils at the Project site, Badger State Solar submitted Form AD-1006, Farmland Conversion Impact Rating to initiate consultation with the USDA NRCS (Appendix K). AECOM submitted Form AD-1006 on behalf of RUS on October 7, 2021 and received a response back from NRCS on October 15, 2021. Projects with total impact rating scores below the threshold value of 160 do not require further consideration under the FPPA. For projects with scores greater than or equal to 160, the FPPA does not require Federal agencies to alter projects to avoid or minimize farmland conversion. However, for such projects, agency personnel are required to consider:

- Use of land that is not farmland or use of existing facilities;
- Alternative sites, locations, and designs that would serve the proposed purpose but convert either fewer acres of farmland or other farmland that has a lower relative value; and
- Special siting requirements of the Proposed Action and the extent to which an alternative site fails to satisfy the special siting requirements as well as the originally selected site.

Badger State Solar considered two alternative sites of approximately 1,750 and 1,200 acres. The alternative sites were included on Form AD-1006. Both sites are primarily agricultural in nature. The approximately 1,200-acre site converts a smaller total acreage of prime farmland. Other characteristics of the approximately 1,200 acre site, such as the ability to avoid other resources resulted in the selection of this site as the Proposed Action.

As shown in Table 3.6-4, there are approximately 14,318,630 acres of land being farmed in the State of Wisconsin. More specifically, there are 221,355 acres of land being farmed in Jefferson County. The removal of approximately 1,200 acres of farmland would impact approximately 0.5 percent of farmland in Jefferson County and a negligible percentage of the land farmed in the State of Wisconsin. Therefore, implementation of the Proposed Action would have a minor, long-term impact due to the conversion of prime farmlands. However, as soils would largely be preserved across the site during operations, after decommissioning, the site could be once again suitable for agriculture.

Formally Classified Lands

There are no Federally-owned properties such as wildlife refuges, parks or scenic river ways located within 2 miles of the Project area. There are seven WRP lands located within 2 miles of the Project area. None of these lands or any easement conditions associated with these easements would be impacted by this Proposed Action. Access would remain open to the public.

The Project will likely not be visible from the four state natural areas due to distance, topography, and tree cover. Additionally, construction and operational activities at the Project would not impact access to or use of these areas.

Therefore, there are no anticipated impacts to formally classified lands in association with the Proposed Action.

Recreation

There are no recreation sites within the Project boundaries. This Proposed Action would have no direct or indirect impact on the national, state, county, and local parks or other recreational areas in the Project vicinity due to their distance from the Project site and the minimal impact of the Proposed Action on the surrounding area.

These recreational resources are not on a direct route to the Project site, and no access issues are anticipated. Similarly, the Proposed Action would have no impact on the use of these local recreation resources. The Project would not be visible from the various parks and would not affect visitors' ability to use or enjoy the different park amenities.

Therefore, the Proposed Action is not anticipated to impact recreational resources or activities within the Project vicinity.

3.7 Visual Resources

This section discusses the potential impacts that construction and operation of the Proposed Action would have on visual resources, including a summary of the methodology used in the assessment, a description of existing conditions, and the effect that the Proposed Action would have on views from key vantage points.

3.7.1 Affected Environment – Visual Resources

3.7.1.1 Background

Visual resources are the visual characteristics of a place and include both natural and man-made attributes. Visual resources are important as they can determine how an observer experiences a particular location. For example, an agricultural setting would elicit very different feelings in an observer than a manufacturing plant or an industrial area. Visual resources are very important to people living in the area, people visiting or passing through an area, and in the context of historically and culturally significant settings. The experience of a historically significant building can be severely altered if

the surrounding visual character is changed. A viewshed is defined as the environment that can be seen from a certain vantage point; a viewpoint is the vantage point from where the visual character is seen.

3.7.1.2 Methodology

Viewshed Analysis

A viewshed map for the Project site was prepared using 10-meter resolution USGS digital elevation model data obtained from WDNR. The extent of the Project study area was estimated to be a 1-mile radius from the preliminary PV panel layout. To account for screening from vegetation, a base vegetation layer was created from the USGS 2011 National Land Cover Dataset. This dataset characterizes land-cover into 30 classes. Areas classified as deciduous forest, evergreen forest, and mixed forest were assigned an assumed tree height of 30 feet. Areas of woody wetlands were assigned a vegetation height of 35 feet, scrub-shrub areas were assigned a height of 15 feet, while emergent herbaceous wetlands and were assigned a height of 5 feet. Using 2020 aerial photography, smaller areas of vegetation, such as windbreaks and isolated forested areas were added for the area within a 0.5 mile of the Project site.

The vegetation heights were added to the ground surface elevations in the digital elevation model to produce a digital surface model. Using Esri ArcGIS® software with the Spatial Analyst extension, a visibility analysis was run assuming a viewer height of 6 feet, a maximum panel height of approximately 12 feet. The visibility analysis program calculates the visibility by reading data cells in the digital surface model and assigning a value based upon the existence of a direct unobstructed line of sight to each panel location. A value of zero is assigned to those cells which have obstructed views, meaning the solar panels cannot be seen. A value of one is assigned to cells at locations from which solar panels can be seen. Once the viewshed analysis is completed, areas covered by forest vegetation, as previously defined, are assigned a visibility code of zero (i.e., obstructed view). The viewshed map shows the results of this analysis. It is important to note that obstructed views caused by buildings or small forested areas such as yard trees or wind breaks that may provide additional screening are not included in the assessment.

Key Observation Point (KOP) Identification

Existing aesthetic conditions of the Project area and its vicinity were documented by Badger State Solar with photographs taken during September and November of 2018. Prior to commencing the photo simulations for the Project, Badger State Solar consulted with the PSCW staff to determine suitability of potential Key Observation Points (KOPs). Four KOPs were selected and used to create visual simulations of what the project may look like once constructed:

- KOP 1 – from Wisconsin Highway 89
- KOP 2 – from US 18

- KOP 3 – from Perry Road
- KOP 4 – from County Road G

Figure 3.7-1 shows the areas from which the Proposed Action would be visible, and the KOP locations chosen to illustrate the potential visual impacts.

Photo Simulation

To show anticipated visual changes associated with the Proposed Action, photo simulations were created for each of the identified KOPs from which photos of the existing view were taken. These simulations were created by generating a three-dimensional model of the proposed solar panels and layout.

A photographic rendering was made for each location to produce a realistic photo rendering of the Proposed Action overlaid on the original photo. Since the photo is in the background, all modeled elements are visible even if they are blocked by intervening vegetation or terrain.

3.7.1.3 Existing Conditions

The Project site is located in the Townships of Jefferson and Oakland, west of the City of Jefferson, in Jefferson County, Wisconsin (Figure 1.1-1). The Project site has a gently rolling surface topography including some small hills and depressions with average slopes less than 2 percent. Site land cover is predominantly cultivated crops with some hay and pasture. Small areas of deciduous and evergreen forest and wetland are present within the Project boundary. Woody and emergent herbaceous wetlands are present within the Primary and Alternate Areas, predominately near the eastern property boundaries south of US 18, with some wetland areas located within the property boundary of a portion of the Primary area north of US 18.

The regional character is mostly rural, with agricultural fields, forested areas, and generally small towns. Attributes associated with both communities would include many single-family homes with yards and trees, a central road with small shops and businesses, schools with large grounds and athletic areas, and small single-lane roads leading into the more spread out residential areas and then on to the rural areas. The communities appear nestled in the midst of a landscape of undulating hills covered in the soft natural tones of agricultural fields and forested areas on both the slight hill tops and valleys. Both communities have trees surrounding the homes and small forested areas on the outskirts. Approximately 25 miles to the west of the Project site is Madison, Wisconsin, a larger highly developed area which includes several smaller towns and suburbs.

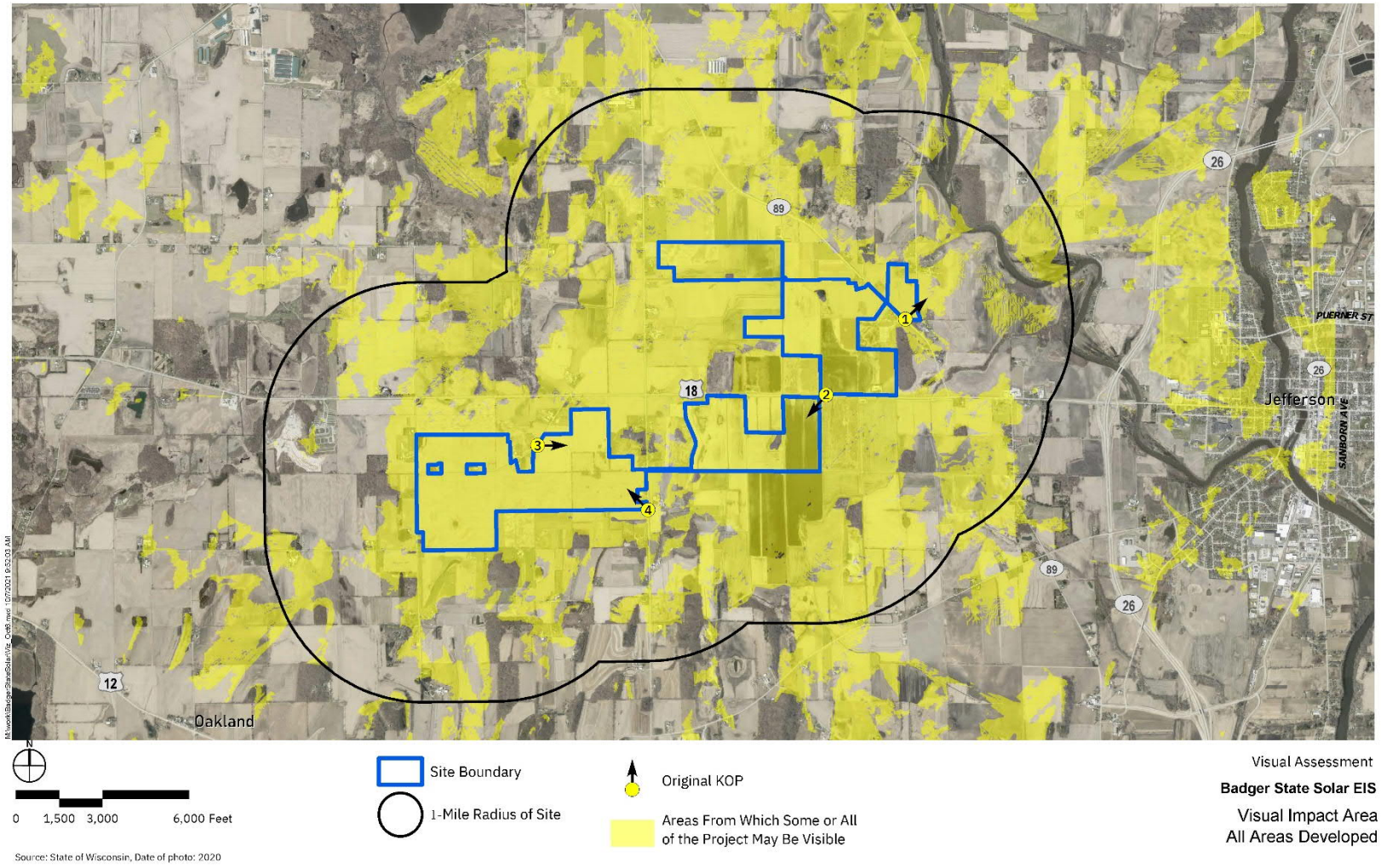

Figure 3.7-1. KOP Photo Locations of the Project Site

Crops predominantly grown within the Project boundary include corn, soybean, hay/silage, mint, and wheat. Crops, with the exception of mint, are generally rotated according to agricultural practices for the area. Because most of the Project land is flat, plow lines typically parallel the longest dimension of the field. Access roads are often located along an existing farm road or along field edges, providing more convenient and reliable access to distant fields.

The Project site has a gentle undulating topography as can be seen in all of the KOP photos (Photos 3.7-1 through 3.7-4). Although the uniformity of the croplands is a man-made visual disturbance, it is still an appealing view due to the colors and topography. The more open areas adjacent to the forested areas present an attractive contrast of colors and shapes. The majority of the Project site is agricultural with small stands of trees following the ephemeral streams between fields. Due to the farming practices, visual appearance would vary over the year; some areas would appear disturbed and weary when the crops have been harvested. Other areas would slightly change appearance due to the crop rotation practice.

Photo 3.7-1 View to the northeast from KOP 1, from the northwest-bound lane of WIS 89, just north of County Road Q. Road signs along County Road Q indicate the far end of the Project site.

Photo 3.7-2 View to the southwest from KOP 2, along the eastbound lane of US 18.

Photo 3.7-3 View to the east from KOP 3, along Perry Road.

Photo 3.7-4 View to the northwest from KOP 4, along County Road G.

3.7.2 Environmental Consequences – Visual Resources

3.7.2.1 No Action Alternative

Under the No Action Alternative, RUS would not fund the Proposed Action. No Project-related impacts to visual resources would result. Existing views would be expected to remain unchanged from the present mix of farmland, small, forested areas, and single-family residences. Impacts to visual resources are possible if the Townships of Jefferson and Oakland grow and land use changes to residential or industrial development. Additionally, visual changes may occur over time as vegetation on the Project site changes. For example, if the land is no longer mowed or farmed, vegetation would likely change from low profile plants to bushes and trees or grasslands.

3.7.2.2 Proposed Action Alternative

This section describes the potential impacts to visual resources should the Proposed Action or No Action Alternative be implemented.

Construction Activities

Equipment including graders, bulldozers, excavators, forklifts, trailers, plows, trenchers, pile drivers and directional boring rigs would be present on the site during site development. Typical construction equipment and uses are shown in Table 1.1-1.

It is anticipated that the majority of vehicles for transporting construction materials and components would be legal load over-the road flatbed and box trucks. Transport of materials would use existing regional roads, bridges, and intersections. Laydown areas would be established within the Project site. Internal site access roads would be required.

Clearing and grading would be conducted as needed to establish site access, internal access roads, staging/laydown areas, foundations, substation, and the solar array field. The majority of the Project site would not require clearing and grubbing. It is anticipated that approximately 2.5 miles of clearing and grubbing would be necessary with not more than 2 acres of tree clearing. It is expected that approximately 2.5 acres of clearing and grubbing would be necessary within the Project area and not more than 2.5 acres of trees would be cleared.

The construction stage of the Proposed Action would create changes to the visible environment of the Project site vicinity. Laydown areas and a Laydown Yard would be established within the Project site as shown on Figure 1.1-2. During construction, heavy machinery would be present, changing the visual aspects of the Project site, which is now an agricultural landscape with few man-made items visible. Construction equipment would include pile-drivers, trenching machines, concrete trucks and pumpers, vibrators, forklifts, boom trucks, and large cranes. Additionally, vegetation would be removed or trimmed, and parts of the Project site would be graded, changing the contouring, coloring, and texture of the scenery attributes. Much of the Project site during construction would appear a mixture of browns and grays due to earthmoving and concrete activities. Water would be used to keep soil from aerosolizing; therefore, dust clouds are not anticipated. These visual impacts would be most noticed from the surrounding roads. Due to the terrain and the large amount of agricultural land in the immediate vicinity, construction and operation of the Proposed Action would be visible from almost 1 mile away. Because the area is sparsely populated, visual impacts during construction would be minor.

Indirect impacts to visual resources around the Project site may occur due to increased traffic and movement of heavy machinery throughout the Project site vicinity and along local roads. Overall, there would be minor temporary direct and indirect impacts to visual resources during the construction phase of the Proposed Action. Construction machinery and vegetation removal would change the views from a natural landscape to an active construction site. However, these impacts are considered minor as they would be temporary (approximately 14 months) and there are few onlookers in the vicinity that would be affected by the appearance of the activities.

Project Description and Visual Attributes

Visual concerns are often associated with both large- and small-scale solar facilities. Construction on the Project site would convert farmland and pastureland, which has been actively cultivated for many years, to a commercial/industrial land use type. Construction activities would result in minor, direct, short-term impacts to visual resources. Although the panels would be visible from the immediate surrounding area, which is sparsely populated, the solar facility would not be visible from major roads in the area due to distance, topography, and intervening vegetation and structures.

The proposed solar array facility would consist of 127,752 tracking PV panels mounted on a steel racking frame. The horizontal trackers would be in their highest position (a maximum of 12 feet above grade) during the morning and evening hours. The bottom edge of the modules would be a minimum of 1 foot above grade at maximum tilt, and up to 4 feet above grade when tilted flat at mid-day. Supporting facilities include an electrical substation. The solar facility would be interconnected to the transmission grid a short 138 kV overhead line between the existing ATC substation and the proposed substation. The entire solar site would be fenced with 7 to 8-feet high deer exclusion fencing. The proposed substation would require a 7 to 8-feet high chain link fence which may include three strands of barbed wire at the top. Each fenced area would have at least one secured entrance gate.

As part of the JDA with local governments, Badger State Solar would fund a vegetative buffer for adjacent, non-participating landowners whose primary residence is in direct view of the solar arrays. Following construction, prairie-style vegetation consisting of native grasses and flowering plants would be planted between the property line and fence line of the Project. Routine annual vegetation maintenance would be carried out. This would include mowing, invasive plant control, trimming or tree removal, and perimeter fence vegetation management.

The Proposed Action does not require any easements from non-participating residents to accommodate the setbacks utilized. Badger State Solar has voluntarily established the following minimum setback distances for the Proposed Action. These setback distances at a minimum meet all applicable requirements under county and township ordinances or rules. Table 3.7-1 shows the proposed setbacks for a variety of situations in the Project site vicinity. No setback waiver areas were identified.

As described in Section 3.6.1.3, there are seven WRP parcels located within 2 miles of the Project area (see Figure 3.6-4). The Project would be visible from the WRP parcels located adjacent to the Project area adjacent to US 18 near the location of KOP 2. The Project would likely not be visible from the remaining WRP properties due to distance, topography, and tree cover.

Table 3.7-1. Design Setbacks

Setback Description	Setback Distance
Residences	100-foot setback from solar components
Property Lines (side and rear)	Minimum of 20-foot setback in the Agricultural Zoning District. No Setback at internal property lines.
Public Road Right-of-way (ROW)	Class B: 70-foot setback from edge of ROW or 140-foot setback from roadway Centerline, whichever is greater. Class D: 50-foot setback from edge of ROW or 85-foot setback from roadway Centerline, whichever is greater.
Drainage Ditches	20-foot setback from top of bank of ditch.
Potentially Navigable Waterways	75-foot Shoreland Zoning setback for structures
Overhead Communication and Electrical Lines (not including lines to individual houses or outbuildings)	20-foot setback to allow overhead line maintenance activities.
Overhead Utility Service Lines (lines to individual houses or outbuildings)	Easement area

During the operation phase of the Proposed Action, minor visual impacts would continue to occur. Disturbed areas would be revegetated with appropriate native species as soon as possible after construction is complete to prevent weed establishment and managed to keep vegetation below 2 feet. New electrical lines would continue to be visible and dirt roads would be apparent throughout the Project site. Deer fence would surround the panel arrays. Photo 3.7-5 shows typical solar panel arrays.

Visually, the scenery with PV panels would be dramatically different from the current scenery on the Project site. As part of the visual resource analysis, Badger State Solar created renderings of what the PV solar power plant would look like from four vantage points adjacent to the proposed panel arrays. No sensitive receptors were identified during the selection of the KOPs.

The visual simulations for the photo locations show the baseline photos and the renderings of the likely appearance of the PV panels from these photo locations. Figure 3.7-1 shows the key observation points from which the photos were taken for the renderings.

Photo 3.7-5.Single-axis, tracking photovoltaic system with panels close to maximum tilt

Visual Simulation 1 was made from KOP 1. The panels are visible above the ground from this location. They hide the view of the existing agricultural field beyond the arrays. Due to their low profile and the Project site topography, the silo and tree are still visible, however. Several residences are in the KOP 1 area, persons residing in these homes would experience moderate negative visual impacts due to the Proposed Action. In this location, the panels appear massive and covering the entire field, constituting a visual change from an agricultural setting to an industrial setting. An existing substation is also in this area, which already makes the view somewhat industrial, reducing the amount of change experienced at this location. In the general area, however, due to the sparce population, impacts to visual resources would be minor.

Visual Simulation 2 was made from KOP 2, the area where the WRP land adjacent to the Project site is located. The visual impacts at this location are less dramatic due to the trees and hill in the background. The panels appear recessed below a surrounding forested area. Due to their color, they almost blend in with the road, creating a visual flow from the foreground to background without a visual disturbance. The overhead transmission line creates the greatest visual disturbance and of greatest impact to passing drivers. At this KOP location, visual impacts would be minor due to the sparse population in the vicinity.

Visual Simulation 1 – KOP 1

Visual Simulation 2 – KOP 2

Visual Simulation 3 was created at the KOP 3 location. This location is near a cluster of residences and farm buildings. The simulation shows the appearance of a Project site entry location, with a gate providing access. The view is significantly different from the existing view due to the addition of the panels, fencing and gate. The panels hide the distant trees and flatten the entire view. The fence and the gate serve to provide some texture to the image. Due to the color of the panels, however, the scene is not as jarring as they blend in with the sky even if they block the view of the fields beyond. Additionally, the setback of grass helps to soften the industrial appearance. Persons residing in the homes at KOP 3 would experience moderate negative visual impacts due to the Proposed Action. In this location, the panels cause a visual change from an agricultural setting to an industrial setting. In the general area, however, due to the sparce population, impacts to visual resources would be minor.

Visual Simulation 4 was made from the photo taken at KOP 4. This area also has a cluster of residences. The view shows a barn and silos next to an agricultural field. The simulation shoes the panels and fencing which would replace the field visually. The view does change somewhat, but due to the existing large structures and the trees in the background it is not as dramatic. The panels appear to be small and beneath the trees and blend in with the road and the sky. The flow of the scene is not interrupted as in the location of KOP 3. Overall, impacts to visual resources at this location would be minor.

Site-wide, after construction of the Project, the gently undulating intermittently green and brown agricultural landscape would be replaced by industrial highly geometric patterns. The viewshed would change from a natural setting to a manufactured and structured appearance. Observers from the various viewpoints would most likely not experience the same aesthetic qualities that currently exist. These impacts would be most noticeable along local roads and from residences in the near vicinity. The gently rolling landscape currently present would be replaced by the angular and geometrically arranged PV panels. Although grading plans intend to maintain the general topography of the Project site, the panels themselves would make the Project site look flatter. The surface of the panels themselves would also alter the view, as the dark, almost black surfaces would provide some reflection of the sky and would not conform to the surrounding agricultural views which have softer tones and angles. However, most residences in the Project site vicinity would not be able to see the Project due to distance, intervening existing vegetation, or the generally low profile of the panel structures. Additionally, the placement of vegetative screening would reduce the impact to residences in the area.

Overall, visual impacts during the operation phase of the Proposed Action would be minor in the immediate vicinity due to a combination of changes to the visual attributes of the area, and the existing general local character. On a larger scale, visual impacts would be minimal due to the sparsely populated immediate area, the trees located on residential properties, and the gently undulating topography.

Visual Simulation 3 – KOP 3

Visual Simulation 4 – KOP 4

Decommissioning Activities

Decommissioning activities would be similar to construction activities, with the appearance of large vehicles and construction machinery during the active decommissioning. Over time, the Project site would either be returned to agricultural use, be abandoned, or be developed. Visual changes could occur if the flat grassy area after decommissioning were allowed to regrow forest or other shrub-like vegetations. Additionally, other types of development could occur if land use was changed from agricultural to residential, commercial, or industrial.

3.8 Transportation

3.8.1 Affected Environment – Transportation

The Project site is in rural Jefferson County, Wisconsin approximately halfway between Madison, Wisconsin, and the outskirts of Milwaukee, Wisconsin, located near the City of Jefferson (Jefferson County, Wisconsin). The Project site is bordered on all sides primarily by agricultural land and rural residences, with scattered wooded areas. The Project site is crossed from east to west by US 18, bordered on the northeast by State Highway 89, and bisected north-south by County Road J. The primary access to the site is US 18. Public roads (US 18, State Highway 89, County Roads G, J, and Q) provide vehicular access to the surrounding residences, agricultural fields, and farm buildings within and near the Project site boundaries. Interstate 94 is located approximately 4 miles north of the site.

The anticipated transportation routes to the Project site from major regional highways are shown in Figure 1.1-3. The closest interstates are Interstate 94 which runs east-west (6 miles north) and Interstate 90 which runs northwest to southeast (13 miles southwest).

There are eight airports within 10 miles of the Project area. The nearest airport to the Project area is Fort Atkinson Municipal Airport, approximately 2.6 miles southeast of the Project area.

3.8.2 Environmental Consequences – Transportation

This section describes the potential impacts to transportation resources should the Proposed Action or No Action Alternatives be implemented.

3.8.2.1 No Action Alternative

Under the No Action Alternative, RUS would not fund the Proposed Action. No Project-related impacts to transportation resources would result. Existing land use would be expected to remain as predominantly disturbed agricultural land, and the existing transportation network and conditions would be expected to remain as they are at present.

3.8.2.2 Proposed Action Alternative

Construction of the Proposed Action would impact roads in the immediate vicinity, which are currently used by local workers, farmers, residents, and visitors. During the peak construction, a typical day would include the transportation of workers, movement of heavy equipment, and transportation of materials. An increase of road traffic would result from construction-related movement of people, materials and equipment. The level of increase would vary depending on the phase of construction. Impacts from construction are anticipated to be direct but short-term. Construction of the Proposed Action would employ up to 300 workers per day during the peak construction period. A majority of these workers would likely commute from the local or regional area. Other workers would come from outside the region and many would likely stay in local hotels.

The Proposed Action would be constructed over a period of up to approximately 14 months. Trip generation for employees, delivery trucks, and construction equipment would vary depending on the phase of construction. It is estimated that on average, approximately 20 trips per day would be generated during construction, though during the peak construction period this may be higher with the additional influx of worker vehicles. These daily trips are expected to include construction vehicles, shipping trucks, and various workers' vehicles. Workers would be present at the Project site from approximately 7 am to 7 pm, Monday through Friday, for the duration of construction. The anticipated transportation routes are shown in Figure 1.1-3. Most, if not all, of these vehicles would be expected to travel Interstate 94 which runs east-west (6 miles north) and Interstate 90 which runs northwest to southeast (13 miles southwest). Local roads such as US 18, State Road 89, State Road 26, or US 12 would be the most likely route for construction vehicles access to the site. The ancillary roads (County Road J, County Road G, etc.) are also likely to see increased vehicle traffic due to the Proposed Action. Twelve to 15 miles of internal roads would be used to access the site, some of which are in existence and others would need to be created during construction.

During construction, the Project components, including the solar modules, mounting system, inverters, transformers, electrical cabling, and ancillary construction equipment would be transported to the site.

Typical transport shipping and container trucks would be used to transport equipment to the site. Typical shipping containers are 40 feet in length and shipping trucks can vary between 45 to 53 feet in length. The majority of the transport vehicles are expected to be 45,000 pounds in cargo weight or less and would typically hold between 34,000 to 44,000 pounds of cargo. The exception is transportation of the Main Power Transformer which would be approximately 317,550 pounds. The unloaded weight of a shipping vehicle or container is typically around 15,000 pounds without any contents and not including the weight of the truck. All transport vehicles would comply with the Wisconsin Department of Transportation's maximum legal dimensions and weights on Federal, state, and local routes.

The supporting solar panel mounting structures would be delivered, offloaded, assembled, and installed in accordance with the construction schedule. The solar modules would then be delivered and offloaded at either a lay-down staging area or, depending on the timing of the deliveries, be placed proximate to the designated construction area. Vehicle trip generation for employees, delivery trucks, and construction equipment would vary depending on the phase of construction.

The Proposed Action would not cause unreasonable congestion or unsafe conditions with respect to transportation impacts of the public roads.

Badger State Solar would coordinate with Jefferson County, as appropriate, to assure construction traffic does not place any undue burdens on the community. Badger State Solar has a County Highway Entrance Permit and Road Use Agreement in place with the Jefferson County Highway Department, which grants permission for the majority of road use and road crossings.

Additionally, Badger State Solar would stagger the trips of the delivery trucks over time in order to keep traffic light and avoid congestion. The solar modules, mounting system, electrical cabling, and inverters are all of appropriate size, shape, and weight to be transported to the site on local, county, state, or interstate roads using shipping vehicles as described. The need for oversize/overweight loads is not expected. Overall, the short-term traffic impacts to transportation resources as a result of construction activities are expected to be minor.

During Project operation, one to three employees would visit the Project site as needed for scheduled/preventative maintenance and for unscheduled maintenances or outages. Periodic washing of the solar panels would increase this number up to 12 employees, and water trucks would be temporarily present onsite for approximately 30 days no more than twice a year. This increased traffic is expected to have no negligible impacts on the local roadways.

During construction, air transportation may be utilized to transport some workers. However, the operation of the solar facility would not affect commercial air passenger or freight traffic in the region and would not adversely affect any crop dusters operating in the vicinity of the Project site. The nearest airport to the Project area is Fort Atkinson Municipal Airport approximately 2.6 miles southeast of the Project site. Badger State Solar utilized the FAA Notice Criteria Tool to determine that the Project site would not exceed Notice Criteria. FAA provided a Notice of No Hazard to Air Navigation. Therefore, the Proposed Action would not interfere with airspace. The Glare Hazard Analysis study (Appendix L) indicated that the Proposed Action would not interfere with airplanes landing at any of the eight airports within 10 miles of the Project. Glare analysis also is predicted to not interference with drivers of vehicles on roads adjacent to the Project (Stantec 2019c). No mitigation measures for glare are necessary. The construction and operation of the Proposed Action would have little to no effect on the operation of the airports in the region.

Overall, with the implementation of mitigation measures, if necessary, direct impacts to transportation resources associated with the Proposed Action construction, operation, and decommissioning would be minor, short-term, and/or infrequent. Further, this action would not result in any indirect impacts on transportation resources.

3.9 Cultural Resources/Historic Properties

3.9.1 Affected Environment – Cultural Resources

Cultural resources include archaeological sites, standing structures, objects, districts, traditional cultural properties, and other properties that illustrate important aspects of prehistory or history or have important and long-standing cultural associations with established communities and/or social groups.

Section 106 of the NHPA of 1966, as amended is specifically designed to address the effects of Federal and/or Federally-funded projects on both built resources (such as buildings, bridges, and levees) and underground (archaeological) resources. The NHPA provided for a national program to support both public and private efforts to identify, evaluate, and protect the nation's important historic and archaeological resources. These resources, collectively called "cultural resources," are evaluated for their eligibility for inclusion in the National Register of Historic Places (NRHP) maintained by the National Park Service. The NRHP is a list of buildings, districts, sites, structures, and objects that are significant to local, state, or national history and prehistory. Cultural resources may qualify for inclusion in the NRHP under one of four primary criteria:

- *Criterion A:* association with events that have made a significant contribution to the broad patterns of American history. This criterion includes literature, ethnic heritage, health/medicine, transportation, and many others.
- *Criterion B:* association with the life of significant persons. Examples of National Register properties nominated under *Criterion B* include George Washington's Mt. Vernon estate.
- *Criterion C*: embodiment of the distinctive characteristics of a type, period, or method of construction. This inclusion also includes the works of a master or buildings that possess high artistic value.
- *Criterion D*: cultural resources that have yielded or may be likely to yield information important in history or prehistory. This category is typically the most relevant criterion for archaeological resources.

Cultural resources that are listed, or considered eligible for listing, on the NRHP are called "historic properties." Federal agencies are required by the NHPA and by NEPA to consider the possible effects of their undertakings on historic properties. "Undertaking" means any project, activity, or program that has the potential to have an effect on a historic property and that is under the direct or indirect jurisdiction of a Federal agency or is licensed or assisted by a Federal agency. Considering an undertaking's possible

effects on historic properties is accomplished through a four-step review process outlined in Section 106 of the NHPA (36 CFR Part 800) including:

1. Initiation (defining the undertaking and the area of potential effect (APE) and identifying the parties to be consulted in the process);
2. Identification (studies to determine whether cultural resources are present in the APE and whether they qualify as historic properties);
3. Assessment of adverse effects, if any (determining whether the undertaking would damage the qualities that make the property eligible for the NRHP); and
4. Resolution of adverse effects (by avoidance, minimization, or mitigation).

Throughout the process, RUS must consult with the appropriate State Historic Preservation Officer (SHPO), Federally recognized American Indian tribes that have an interest in the undertaking, and any other party with a vested interest in the undertaking.

As part of the evaluation process for this Proposed Action, Commonwealth Heritage Group, INC. conducted the *Due Diligence Archaeological Survey for Badger State Solar Project, Jefferson County, Illinois* archaeological survey in October through December 2018 to determine the presence of pre-contact and historic/ post-contact cultural resources that are listed in or potentially eligible for the NRHP (Edwards et al. 2019).

The area of potential effects (APE) represents as an area that includes all Project construction and excavation activity required to construct, modify, improve, or maintain any facilities; any right-of-way or easement areas necessary for the construction, operation, and maintenance of the Project; all areas used for excavation of borrow material and habitat creation; all construction staging areas, access routes, utilities, spoil areas, and stockpiling areas. Impacts resultant from the undertaking at the same time and place with no intervening causes, are considered “direct” regardless of its specific type (e.g., whether it is visual, physical, auditory, etc.). “Indirect” effects to historic properties are those caused by the undertaking that are later in time or farther removed in distance but are still reasonably foreseeable.

The APE initially considered for this Proposed Action consisted of three development areas: the Primary Area measuring approximately 1,200 acres in size, the Alternate Area measuring 335 acres in size, and the Optional Area (required by the WPSC) which consists of an additional 211 acres north. The viewshed element of the APE, within which the potential for effects to extant aboveground historic resources would require consideration, extends up to 0.5 miles from any proposed aboveground infrastructure (a distance which can be modified during field investigations due to characteristics of the surrounding landscape and topography). The Project APE defined for direct effects to archaeological resources (coincident with the proposed limits of ground disturbance) does not include any federal and/or tribal land(s) as defined pursuant to 36 CFR §

800.16(x)]. Following completion of the archaeological survey, the Alternate and Optional Areas were eliminated from the Project site.

3.9.1.1 Archeological Resources

Previous Surveys

Portions of the Project have been previously surveyed for cultural resources. The University of Wisconsin-Milwaukee's Southeast Wisconsin Archaeology Project surveyed approximately 150 acres of the northern portion of the Project in the early 1980s. Two archaeological sites were identified within the Project as a result of this survey (Goldstein as cited in Edwards et. al. 2019). A highway transportation corridor survey conducted in the early 1990s intersected the east edge of the Project, and identified one site (within the Project (Bloom as cited in Edwards et. al. 2019). A study by the USDA consisting of approximately 20 acres of the northern portion of the Project and a separate survey for an electrical transmission line through 30 acres of the east side of the Project area did not identify any sites (Harvey as cited in Edwards et. al. 2019).

Fieldwork Methodologies

Commonwealth Heritage Group, INC. (Commonwealth) conducted an archaeological survey in association with the Badger State Solar CPCN Application (Edwards et al. 2019). This report is on file at RUS. The survey began with a desktop review which identified previous surveys and known archaeological resources within and in the vicinity of the Proposed Action. During desktop review, Commonwealth identified that four sites were previously reported within the potential limits of the Project (Edwards et al. 2019).

Commonwealth developed a probability model that divided the Proposed Action into areas of low, moderate, and high priority for the presence of pre-contact archaeological resources, and thereby defined a stratified survey approach for addressing each area. Considering the results of the background research and probability model, Commonwealth performed a pedestrian survey of portions of the Project area and visited the previously documented archaeological sites to determine if the sites were present and if they could be impacted by Project activities (Edwards et al. 2019).

Archaeological Survey Results

Commonwealth did not identify any new archaeological sites within the areas surveyed. Of the previously documented sites one, a historic cemetery, will require a minimum 10 foot avoidance buffer between the site and the Project boundary. The remaining three sites are considered not eligible for the NRHP and no further archeological work or protection measures are necessary for these sites (Edwards et al. 2019).

3.9.1.2 Historic Structures

As part of the Phase I investigations, Commonwealth completed an architecture/history review of the Project area between October 2018 and January 2019. During the initial desktop survey, Commonwealth identified eight extant historic-age structures recorded in the Wisconsin Historic Preservation Database within the immediate Project vicinity. The eight structures are all situated adjacent to county/township roads surrounding the Project. In 2013, Legacy Architecture, Inc., conducted an intensive survey of Jefferson County which included evaluation of these structures. Two of the structures are identified as schoolhouses, the others are residential houses. Based on the results of that survey, one of the structures was recommended as eligible for NRHP listing (AHI #6526, the Eustis House). The other structures were recommended as not eligible for the NRHP (Rainka 2019). All eight structures are listed in Table 3.9-2.

Table 3.9-1. Summary of Aboveground Resources and their NRHP Recommendations

Number	Description	NRHP Recommendation
AHI #6525	Historic house located off Perry Road in Oakland	Not Eligible
AHI #6526	Octagon house located off Perry Road in Oakland	Eligible
AHI #6527	Historic house located off Kreklow Road in Oakland	Not Eligible
AHI #6530	Schoolhouse located off Scheppert Road in Oakland	Not Eligible
AHI #224546	Historic house located off County Road G in Jefferson	Not Eligible
AHI #224547	Schoolhouse located off County Road G in Jefferson	Not Eligible
AHI #224548	Historic house located off County Road G in Jefferson	Not Eligible
AHI #224730	Historic house located off Perry Road in Oakland	Not Eligible

Source: (Edwards et al. 2019)

Based on the results of the desktop survey, Commonwealth revisited the eight previously surveyed above-ground resources in October 2018 and January 2019. Commonwealth confirmed that the appearances of the structures were unchanged since the 2013 survey. Therefore, Commonwealth did not recommend any changes to the previous NRHP eligibility recommendations identified in Table 3.9-2 (Rainka 2019).

The William Eustis House (AHI #6526) is located off Perry Road in the Town of Oakland, Wisconsin, adjacent to the Project area. Because of the proximity to the Project, in April 2019, Commonwealth completed a Determination of Eligibility to formally assess the property's NRHP eligibility. Built between 1848 and 1850, the Eustis House is a rare, two-story Octagon-style residential structure, potentially one of the oldest of this style in Wisconsin. The house is constructed from locally quarried limestone which was covered with a coat of cement in 1912. The house is located 4.40 acres, approximately 85 feet from the road, and surrounded by mature trees and other vegetation on its north, south, and west sides. This vegetation provides a visual barrier between the structure and much of the surrounding area. The property also includes

three barns, one of which is a nineteenth century contributing structure, located on the north and east sides. Agricultural fields, not associated with this parcel, surround the property on all sides. The Determination of Eligibility concluded that the Eustis House is a locally representative example of the unique nineteenth century octagon architectural style. Therefore, Commonwealth recommended the Eustis House as eligible for the National Register under Criterion C: Architecture (Edwards et al. 2019).

3.9.1.3 Tribal Consultation

The state of Wisconsin is comprised of land ceded to the United States government by Native Nations. The Project site is located within land cession 174. Details on these land cessions can be found in the *Eighteenth Annual Report of the Bureau of American Ethnology to the Secretary of the Smithsonian Institution* (Smithsonian Institution and Bureau of American Ethnology 1895).

RUS initiated consultation with the following Federally recognized Native American tribes with an initiation letter on November 23, 2021:

- Citizen Potawatomi Nation, Oklahoma
- Forest County Potawatomi Community of Wisconsin
- Fort Belknap Indian Community of the Fort Belknap Reservation of Montana
- Ho-Chunk Nation of Wisconsin
- Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin
- Menominee Indian Tribe of Wisconsin
- Miami Tribe of Oklahoma
- Osage Nation
- Prairie Band Potawatomi Nation
- Winnebago Tribe of Nebraska

RUS will follow the post-review discovery plan (Appendix M) and notify interested Tribes if any cultural materials are found during Project activities.

3.9.2 Environmental Consequences – Cultural Resources

3.9.2.1 No Action Alternative

Under the No Action Alternative, RUS would not fund the Proposed Action. Existing land use would be expected to remain unchanged. Ground disturbing agricultural practices at the Project site would continue to have the potential to impact intact cultural resources at the surface or within the first 8 to 10 inches of soil. No impacts would be anticipated to the NRHP-eligible Eustis House as there would be no viewshed changes. Therefore, impacts to cultural resources associated with the No Action Alternative would be anticipated to be minor.

3.9.2.2 Proposed Action Alternative

As a result of the archaeological and architecture/history investigations conducted for the Proposed Action, two of the resources within the APE were recommended for avoidance or further investigations: an historic cemetery and the William Eustis House. Project activities would avoid the historic cemetery boundaries by a minimum of 10 feet. With regard to the NRHP-eligible William Eustis House, a No Adverse Effect finding was recommended based on the following factors: lack of any potential for physical destruction, damage or alterations to the property; an absence of proposed activities which could alter the architectural character of the Eustis House; and presence of intervening visual intrusions (dense vegetation, trees and barns) between the house and the proposed solar arrays. As currently designed, the solar modules arrays will be installed across surrounding agricultural fields and visually absorbed within the row-crop landscape visible from the Eustis House. Based on these results, a finding of No Adverse Effect in accordance with 36 CFR § 800.5(b) is appropriate for the Proposed Action. RUS submitted this finding in a letter to the Federally recognized tribes and the SHPO in November 2021 and January 2022, respectively. These letters are on file at RUS. On January 27, 2022, the SHPO concurred the Proposed Action would have no adverse effects to eligible properties. The proposed overhead transmission crossing of Highway 18 was added to the Proposed Action in February 2022. RUS anticipates additional SHPO and tribal consultation regarding this proposed change. The results of that consultation will be reported in the Final EIS.

A post-review discovery plan has been developed for the Project, designed for implementation in the event any cultural resources are encountered during ground-disturbing activities associated with the construction and installation of the Project. This plan can be found in Appendix M.

3.10 Public Health and Safety

This section describes an overview of existing human health and safety, and the potential impacts associated with the Proposed Action, including hazardous materials and waste management. Public health issues include emergency response and preparedness to ensure Project construction and operation do not pose a threat to public health and safety. Safety issues include occupational (worker) safety in compliance with the Occupational Safety and Health Administration (OSHA) standards. Safety issues also include identification of recognized environmental conditions (REC) for protection of workers and the environment and overall traffic safety associated with construction and operational activities. Hazardous materials and waste management issues include the generation, storage, and disposal of hazardous and nonhazardous wastes.

3.10.1 Affected Environment – Public Health and Safety

3.10.1.1 Public Health and Safety

There are numerous public emergency services in the vicinity of the Project site that would respond in the event of an emergency. Public emergency services in the area include regional hospitals, law enforcement services, and fire protection services. Hospitals near the Project area include Fort HealthCare Jefferson located in Jefferson Country approximately 3.5 miles east of the Project area and Fort Memorial Hospital located in Jefferson County approximately 5.5 miles to the west. The Flight for Life in Waukesha, Wisconsin is located approximately 31 miles to the east of the Project boundary in Waukesha County. Law enforcement in Jefferson, Wisconsin is provided by Jefferson City Police Department located in Jefferson County approximately 4 miles to the east) and Jefferson County Sherriff's office located approximately 4 miles to the east (Jefferson Police Department n.d.). Fire protection services are provided by the Jefferson City Fire Department located approximately 4.5 miles to the east and Lake Mills Fire Department located approximately 6 miles to the north (City of Lake Mills Wisconsin 2020, Jefferson Wisconsin n.d.). Emergency contacts and procedures would be designated by Badger State Solar prior to construction. Any hazardous materials released during Project activities would be addressed by the local Hazardous Materials Response Team in Jefferson County (Jefferson Wisconsin 2020). The Jefferson County Emergency Management Department prepares emergency management plans and coordinates and participates in local emergency management training and exercises related to natural or man-made disasters (Jefferson County Wisconsin n.d.).

3.10.1.2 Hazardous Materials and Waste Management

The Resource Conservation and Recovery Act (RCRA) is the public law that creates the framework for the proper management of hazardous and non-hazardous solid waste. Solid waste includes both hazardous and non-hazardous waste. The EPA defines solid waste as any "garbage or refuse, sludge for a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, resulting from industrial, commercial, mining, and agricultural operations, and from community activities." The definition of solid waste is not limited to wastes that are physically solid, as many solid wastes are liquid, semi-solid, or contained gaseous material (EPA 2021). Solid waste also includes construction debris and excavated soils.

The term hazardous materials is a broader term collectively used to describe:

- Hazardous wastes as defined by RCRA (42 U.S.C. 6901),
- Hazardous substances as defined in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 101(14) and includes listed hazardous wastes or unlisted solid wastes that exhibit specific characteristics such as ignitability, corrosivity, reactivity, or toxicity characteristic) (40 CFR 302),

- Asbestos (referring to the naturally occurring fibrous minerals used in many commercial and industrial applications) (40 CFR 302),
- Petroleum products (materials derived from crude oil such as fuel oil and gasoline),
- Any item or chemical, which when being transported or moved in commerce, is a risk to public safety of the environment and is regulated as such under its Pipeline and Hazardous Materials Safety Administration regulations (49 CFR 100-199), and
- Any substance or chemical which is a "health hazard" or "physical hazard" as defined by OSHA (29 CFR 1910.1200).

As part of the evaluation process for this Proposed Action, the Badger State Solar Phase I Environmental Site Assessment (ESA) was conducted in 2019 to perform all appropriate inquiries into the past ownership and uses of the Project site, as stipulated by the EPA in 40 CFR Part 312 consistent with good commercial or customary practices specified by ASTM International (ASTM). The standard includes procedures to identify RECs, including historical recognized environmental conditions (HRECs), and controlled recognized environmental conditions (CRECs) that may exist at a property to qualify Badger State Solar, in part, for specific future landowner protection to CERCLA liability. The Phase I ESA included a visit to the Project site and its vicinity on January 10, 2019 (Stantec 2019).

Information gathered from interviews, reviews of existing data, and a site reconnaissance to determine if RECs are present in connection with the Project site was evaluated. Table 3.10-1 provides findings and opinions presented in the Phase I ESA (Stantec 2019).

Table 3.10-1. Findings and Opinions Presented in the Phase I ESA

Findings	Opinions
Finding 1: The Study Area was developed for agricultural use before the 1930s and has continued to be used for this purpose to the present. It is likely that various pesticides, herbicides, and fertilizers have been used on cropland in the Study Area.	Opinion 1: No evidence of use, overuse or spillage of chemicals was observed at the Study Area. Provided that chemicals, if used, were applied according to manufacturer's instructions, this is considered a non-scope *de minimus* condition and not a CREC, HREC, or REC.
Finding 2: An environmental records search was performed and identified one site within their respective ASTM E 1527-13 search radii of the Study Area that may represent CRECs, HRECs, RECs or *de minimis* conditions.	Opinion 2: Based on one or more of the following reasons: distance from a Participating Parcel in the Study Area, position of sites with respect to assumed groundwater flow direction, the native soils, and regulatory status, none of the sites identified in the environmental records search report are expected to affect soil or groundwater quality at the Study Area. Therefore, the environmental records search identified no CRECs, HRECs, RECs, or *de minimis* conditions at or near the Study Area.

Findings	Opinions
Finding 3: Stantec was not able to obtain historical records that document the Study Area history in 5-year intervals. These data failures represent data gaps.	Opinion 3: The lack of review of this information is not considered significant. Based on the information obtained during this ESA, the absence of this information did not appear to affect the ability of the environmental professional to identify RECs, HRECs, or *de minimis* conditions.
Finding 4: Environmental liens or activity use limitations encumbering the Study Area or in connection with the Study Area were not reviewed as part of this Phase I ESA.	Opinion 4: The lack of review of this information did not appear to affect the environmental professional's ability to identify RECs, HRECs, or *de minimis* conditions.
Finding 5: Debris areas were observed on the eastern portion of Parcel No. 014-0614-0621-000, northwest corner of Parcel No. 014-0614-0844-000, and on the south side of the small, forested area on Parcel No. 014-0614-0714-000. The debris included abandoned vehicles, empty 55-gallon barrels, miscellaneous concrete, wood, plastic, and metal, and scrap asphalt shingles.	Opinion 5: Improper solid-waste disposal practices could affect soil and/or groundwater quality in the Study Area and represent a REC.
Finding 6: Before 2012, distillation of mint occurred inside the building on Parcel No. 014-0614-0543-000. Since 2012 the building has been used for agricultural equipment storage, loading of agricultural chemicals sprayers and equipment maintenance. The owner reported no spills had occurred on the parcel since he purchased the parcel in 2012. No evidence of spills on the ground surface adjacent to the building was observed during the Study Area reconnaissance.	Opinion 6: Historical mint distillation is not considered a REC, HREC, or *de minimis* condition. The historical transfer and storage of agricultural chemicals in this building is a REC as possible historical releases of agricultural chemicals that could affect soil and/or groundwater quality may have occurred. However, since there were no recorded releases and no visual evidence of releases, a historic release is unlikely to affect the solar project if construction activities are greater than 100 feet from the building.
Finding 7: 1,000-gallon and 3,000-gallon aboveground storage tanks (ASTs) that were empty but formerly contained diesel fuel or #2 fuel oil were observed adjacent to northeast corner of the building on Parcel No. 014-0614-0543-000. The ASTs were formerly used to fuel fleet vehicles and a mint still inside the building on the parcel. An empty approximately 300-gallon AST was present along southern edge of forested area on Parcel No. 014-0614-0714-000. The ASTs were not placed within secondary containment. No evidence of spills or leaks associated with the ASTs were observed during the Study Area reconnaissance.	Opinion 7: The historic transfer and storage of petroleum products from the ASTs in the Study Area are RECs as possible historical releases of petroleum that could affect soil and/or groundwater quality may have occurred. However, since there were no recorded releases and no visual evidence of releases from the ASTs, a historic release is unlikely to affect the solar project if construction activities are greater than 100 feet from the ASTs.
Finding 8: As part of the interview process, Owner Questionnaires were sent to participating landowners in the Study Area for completion. As of the date of this report, 74% of the Owner Questionnaires have been returned. The missing Owner Questionnaires represent a data gap.	Opinion 8: Based on the information obtained during this Phase I ESA and general knowledge of development within and adjacent to the Study Area, the absence of the remaining Owner Questionnaires affected, but did not significantly affect, the ability of the environmental professional to identify RECs, CRECs, HRECs, or *de minimis* conditions.

Findings	Opinions
Finding 9: Stantec observed the adjacent properties from the Study Area or nearby public rights-of-way.	Opinion 9: No indications of CRECs, RECs, HRECs or *de minimis* conditions were observed in connection with the adjacent properties.

The Phase I ESA revealed no evidence of RECs in the Project area, except for the following:

1. Transfer and storage of fuel oil and/or diesel fuel associated with aboveground storage tanks on two parcels,
2. Historical transfer and storage of agricultural chemicals in the building on one parcel, and
3. Areas of debris (abandoned vehicles, empty 55-gallon barrels, miscellaneous concrete, wood, plastic, metal and/or scrap asphalt shingles).

3.10.2 Environmental Consequences – Public Health and Safety

This section describes the potential impacts to public health and safety from implementation of the Proposed Action or No Action Alternative including impacts from hazardous material and waste management.

3.10.2.1 No Action Alternative

Under the No Action Alternative, RUS would not fund the Proposed Action. There would be no direct or indirect Project-related impacts to public or occupational human health and safety. No direct or indirect Project-related impacts from hazardous materials and waste management would occur. Existing land use would remain as primarily farmland with some undeveloped areas. Agricultural practices would be expected to continue, including use of petroleum products, agricultural pesticides, herbicides, and fertilizers. Existing human health and safety issues and hazardous materials and waste management would remain in their current state.

3.10.2.2 Proposed Action Alternative

<u>Public Health and Safety</u>

Under the Proposed Action Alternative, 1,200 acres of relatively level, predominantly agricultural crop land would become a utility grade solar farm. The Proposed Action could result in the potential public health and safety hazards.

Traffic Safety

Health and safety plans established and adhered to by the construction team would include traffic procedures to stagger deliveries and minimize potential safety concerns. Construction traffic would use existing public roads (shown on Figure 1.1-3) to access the site. Haul routes for construction equipment accessing the Project site would include Wisconsin Highway 26 and Wisconsin Highway 89 from the north or US 18 from the

east or west. Vehicular access would include Interstate 94 and Interstate 90 along with Wisconsin Highway 26, Wisconsin Highway 89, and US 18. As described in Section 3.8, traffic congestion is not anticipated as a result of this Proposed Action. Appropriate signage would be utilized around site entrances to notify all drivers of new access points. The additional construction traffic increases the number of vehicles on these rural roadways somewhat which can result in a corresponding increase in the potential for vehicular accidents; this increase is not anticipated to be significant due to the remote area and low numbers of vehicles that use these roadways on a daily and hourly basis.

A JDA between Badger State Solar and Jefferson County formalizes the authorized use of Jefferson County and Jefferson Township roads: County Road G, County Road J, Perry Road, and US 18. The agreement also formalizes road repair obligations. If construction vehicles need to use county, town, or local roads not listed in the JDA, Badger State Solar would negotiate such use with all affected parties/governments. The JDA also establishes the permitted construction hours as 7:00 a.m. to 7:00 p.m. on Monday through Saturday and as 10:00 a.m. to 7:00 p.m. on Sunday. This agreement between the County and Badger State Solar should further minimize the potential for traffic safety concerns due to the various provisions of the agreement.

Spill Prevention Containment and Countermeasures Plan
The construction contractor would provide a site-specific SPCC Plan meeting all EPA requirements and outlining the procedures and preventative measures that would be followed throughout the construction period. The SPCC Plan would be kept onsite during construction activities. Badger State Solar and its contractors would comply with the plan. In addition to detailing the Project site chemicals and where they are used and stored, the SPCC Plan would detail:

- Preventive measures to minimize potential impacts,
- Mitigation methods in the event of a spill,
- Locations of construction spill kits (gloves, booms, sorbents, barrier materials, etc.),
- Emergency notification procedures and forms, and
- Contact information for notifying required individuals in the event of a spill.

Frac-Out Plan
In addition, written site-specific contingency plans for a frac-out event would be developed during final engineering for the layout designed for construction and would be kept at the Project site. Frac-out occurs during drilling operations when drilling mud is inadvertently released through fractured bedrock or flows from the bedrock into surrounding sand toward ground surface.

Operations
Operations and maintenance of the Proposed Action would involve two full-time employees onsite two days per week. Activities would include facility repairs, solar

panel washing, and vegetation management. Normal rainfall is anticipated to limit the need for panel washing to less than twice per year; the onsite well would provide water for this activity. Vegetation management would include routine mowing, invasive plant control, and tree maintenance within the fenced solar facility. Vegetation conditions outside the fence would be inspected twice a year.

Stray voltage is a common phenomenon that may affect livestock such as dairy cows. Stray voltage occurs when an electrical current from an electrical wiring system to flows to another conductive object. All farms with electrical service have some level of stray voltage (WPS 2021). The Project area supports many farms and agricultural areas. Solar power plants have protection systems to isolate faults within the facility and contribute balanced three-phase power to the grid. They do not represent increased risk factors for stray voltage. Further, there would be no uninsulated power cables buried based on the Project site, and because of this, an environmental analysis conducted as part of the CPCN application concluded that stray voltage effects arising from any of the Project facilities would be unlikely (Schumacher 2019). There would be an overhead crossing for collector lines over US 18. Badger State Solar would make available stray voltage testing for all agricultural confined animal operations within one-half mile of the solar farm Project area to measure and minimize potential impacts to such operations.

Emergency Response

Emergency response for the Project site would be provided by the local, regional, and state law enforcement, fire, and emergency responders described in in the previous sections. Normal local fire and emergency medical service (EMS) service would be relied upon during construction, operation, and decommission. The closest air ambulance services provider to the Project area is Flight for Life in Waukesha, Wisconsin located approximately 31 miles east of the Project boundary.

Cooperation and training meetings would be organized and held with local emergency providers. Periodic meetings with fire and EMS providers would be held to maintain cooperation and familiarity with site facilities. A fire safety protocol for the Proposed Action would be made available to local departments. Photovoltaic generating panels and related facilities do not present unique or unusual fire or other safety hazards. Site facilities do not include difficult elevation or facility access situations. In the event Badger State Solar adds a Battery Energy Storage System, fire and EMS personnel would be trained on any special needs it presents.

Decommissioning

Public and worker health and safety hazards during decommission activities in 25 to 40 years would be similar to the hazards during construction activities. The site would be returned to its previous agricultural usage. Over the life of the Proposed Action, impacts to public and worker health and safety would be temporary and minor.

Public Health and Safety Summary

Overall, impacts to human health and safety related to construction of the solar facility would be short-term and minor. No human health or safety hazards would be anticipated as a result of solar facility operations. Public and worker health and safety hazards during decommission activities would be similar to those during construction. Overall, impacts to human health and safety in association with implementation of the Proposed Action would be temporary and minor. BMPs (such as worker safety training, daily safety briefings, use of proper PPE, use of appropriate signage and barricades/fencing) would be employed to minimize health and safety risks to the public and to workers throughout construction, operation, and decommissioning of the proposed solar facility.

Hazardous Materials and Waste Management

The Phase 1 ESA of approximately 1,799 acres of Jefferson Township properties on behalf of Badger State Solar revealed three RECs related to fuel, chemicals, and debris in four parcels as discussed below:

- The transfer and storage of fuel oil and/or diesel fuel associated with aboveground storage tanks on Parcel Nos. 014-0614-0543-000 and 014-0614-0714-000;
- The historical transfer and storage of agricultural chemicals in the building on Parcel No. 014-0614-0543-000; and
- Areas of debris observed on Parcel Nos. 014-0614-0621-000, 014-0614-0844-000, and 014-0614-0714-000.

Stantec recommended an additional investigation that includes collection of soil and/or groundwater samples (Phase II ESA) to further evaluate the RECs. However, if the final Project design maintains at least a 100-foot buffer from each REC, the RECs would no longer be likely to impact the Project site and a Phase II ESA may not be warranted (Stantec 2019a). Badger State Solar intends to maintain the 100-foot buffer around each identified REC. Should hazardous materials or waste be discovered outside the buffer or elsewhere on the property during construction, the materials would be characterized, removed, and disposed at an approved disposal facility.

The Proposed Action would have minor indirect adverse impacts on the environment due to potential inadvertent spills from construction-related equipment, chemical use for vegetation management, and an increase in solid waste generation and disposal. Construction limits would be at least 100 feet away from identified RECs and therefore, areas of known RECs would not be disturbed and would be unlikely to result in adverse impacts during Project development.

Construction, operations, maintenance, and decommissioning could result in the accumulation of potentially hazardous and nonhazardous waste. Badger State Solar

does not anticipate any long-term storage of hazardous materials, such as pesticides, herbicides, oils, or petroleum products. Badger State Solar would treat and temporarily store wastes generated until the waste could be shipped for offsite disposal. The discussion below describes the generation, storage, waste management activities, waste minimization and pollution prevention measures, and transportation of potentially hazardous and nonhazardous waste.

During construction, operations, and maintenance, Badger State Solar expects to generate a variety of solid wastes. Wastes generated during construction are expected to include: scrap steel and other metals, scrap plastics and wood, and other construction items. Lubricating oil, hydraulic oil, and grease might be necessary on site to assemble various pieces of equipment and systems. Wastes generated during operations and maintenance are expected to include defective or broken electrical materials, empty containers, office waste, miscellaneous solid waste, and hazardous waste such as herbicide. Batteries used in vehicles, equipment, or machinery during construction, operation, and maintenance could also be potentially hazardous waste, depending on battery type (Schumacher 2019).

During construction of the solar facility, the expected chemicals onsite would include diesel fuel, gasoline fuel, oil, grease, spray paint, and galvanization paint. Gasoline and diesel fuel would be stored in individual tanks in the vehicles and refueling of vehicles would be contracted with a local fuel delivery service with refueling to be completed in the evening hours. Other hazardous chemicals on site would be stored in trailers located at the central laydown area (Badger State Solar 2019b).

Construction-related equipment contains hazardous waste such as diesel fuel, insulating oils, hydraulic fluid, drilling fluids, lubricants, and solvents. These materials have the potential to result in spills or leaks during the refueling and maintenance of equipment and vehicles and when equipment is not maintained in proper working order. Workers within the Project site may also use supplies containing hazardous materials to conduct their work. For example, herbicides could be used during construction and maintenance to manage vegetation.

Although the spill or release of potentially hazardous materials or waste during construction is an unlikely event, spill prevention plans would be in place to prevent and control any spills. Therefore, operation of construction-related equipment would result in a negligible adverse direct effect.

Photovoltaic modules contain cadmium telluride (CdTe). Cadmium is a toxic metal; however, independent toxicity studies indicate that Cd is more toxic in the elemental form compared to the relatively stable CdTe compound (Zayed and Philippe 2009). Under normal conditions, CdTe is secured within sealed solar panels and represents no hazard to workers or the public. Damaged modules may create worker exposure and may require special handling during facility repairs and decommissioning. First Solar, manufacturer of photovoltaic modules, states that chemical degradation from

photovoltaic module breakage is unlikely because of the low vapor pressure and low solubility of CdTe. Damaged photovoltaic modules and those at the end of their useful life would be directed to a recycling facility. By not discarding in landfills, the potential for any leaching of Cd or Te into soils or groundwater would be avoided (Schumacher 2019). Therefore, the risk of any toxic metals affecting the environment through the use or appropriate disposal of CdTe photovoltaic modules would not be significant. Absent recycling opportunities, damaged or decommissioned photovoltaic module waste containing toxic CdTe would be characterized and managed as hazardous waste if appropriate.

Badger State Solar would temporarily collect and store solid wastes onsite and then transport solid wastes offsite to either a landfill, storage facility, or recycling facility. For example, scrap metal, batteries, pesticides, mercury-containing equipment and bulbs, used oil, and antifreeze would be collected and stored temporarily and then recycled or recovered at an offsite permitted recycling or recovery facility, as appropriate. Badger State Solar would dispose of hazardous wastes generated at the facility at a licensed hazardous waste disposal site. Badger State Solar would not store or treat hazardous wastes onsite; therefore, a hazardous waste treatment or storage permit from the WDNR, which has the permitting authority for hazardous wastes under Wisconsin Administrative Code 660, would not be required. Sanitary wastewater from the Proposed Action would be sent to the City of Jefferson wastewater treatment facility for treatment and disposal.

During decommissioning, a similar complement of hazardous materials would be present to support vehicles and equipment as was present during facility construction. However, the decommissioning period would likely be shorter than that of initial construction. Wastes generated during decommissioning would primarily be derived from the maintenance of vehicles and equipment and anticipated to be managed in a similar manner as during construction, with the same potential for adverse impacts. Much of this volume of waste would have recycling options. Impacts during facility dismantlement would include potential spills or leaks and releases to the environment during temporary onsite storage. Special handling of PV modules containing toxic metals would be required to prevent their accidental breakage and to preserve any opportunities for the recycling of the solar cell materials (at offsite facilities).

As described above, processes for hazardous materials and waste management would be in place during Project construction, operation, and decommissioning. Impacts from hazardous materials and waste during solar facility construction, operation, and decommissioning would be insignificant.

3.11 Socioeconomics and Environmental Justice

This section describes an overview of existing socioeconomic conditions within the Project area and the potential impacts that would be associated with the Proposed Action and No Action Alternative. Components of socioeconomic resources that are analyzed include population, employment, and income.

3.11.1 Affected Environment – Socioeconomics and Environmental Justice

In order to identify general socioeconomic patterns in the Project site, various socioeconomic characteristics have been analyzed, including population growth trends, racial and ethnic characteristics, economic indicators, and employment data. Data is analyzed at various geographic levels for the purpose of comparison.

3.11.1.1 Area of Influence

The Project site is located west of the City of Jefferson in the Townships of Jefferson and Oakland in Jefferson County, Wisconsin. The Proposed Action would take place on approximately 1,200 acres located on the north and south sides of US 18, approximately 2 miles west of the City of Jefferson. A majority of the Project site is located west of State Highway 89.

3.11.1.2 Population

Population trends and projections are presented in Table 3.11-1. In 2019, the population of Jefferson County was 84,701 and Jefferson City was 7,991 (USCB 2019b). Jefferson County is classified as a nonmetropolitan area, but is part of the Watertown-Fort Atkinson, WI metropolitan statistical area (Data.gov. 2017, USDA 2013). Population growth in both Jefferson County and Jefferson City have been trending upward; however, growth in the county is stronger than the city. Between 2000 and 2019, population in Jefferson County and Jefferson City increased 14.4 percent and 8.9 percent, respectively. Similarly, population of the United States and the state of Wisconsin increased 15.4 percent and 8.0 percent, respectively, during the same period (USCB 2000, USCB 2019b).

Table 3.11-2. 2000 – 2030 Population Data

Area	2000	2010	2019	Projection 2030	Percent Change 2000 – 2019 (%)	Percent Change 2019 – 2030 (%)
Block Group 2, Census Tract 1006.02, Jefferson County, Wisconsin	1,917	1,901	1,881	N/A	-1.9	N/A
Block Group 2, Census Tract 1007, Jefferson County, Wisconsin	759	844	777	N/A	2.4	N/A
Jefferson City, Wisconsin	7,338	7,973	7,991	8,521	8.9	6.6

Area	2000	2010	2019	Projection 2030	Percent Change 2000 – 2019 (%)	Percent Change 2019 – 2030 (%)
Jefferson County, Wisconsin	74,021	83,686	84,701	97,305	14.4	14.9
Wisconsin	5,363,675	5,686,986	5,790,716	6,375,910	8.0	10.1
United States	281,421,906	308,745,538	324,697,795	355,101,000	15.4	9.4

Source: (USCB 2019b, WIDOA 2013a, WIDOA 2013b, USCB 2000, USCB 2010, USCB 2018, Jefferson Wisconsin 2020)

The upward trend in population is projected to continue through 2030. Between 2019 and 2030, population is projected to increase in Jefferson County by 14.4 percent and by 6.6 percent in Jefferson City (WIDOA 2013a). Similarly, population is projected to increase 10.1 percent in Wisconsin and 9.4 percent in the United States between 2019 and 2030 (USCB 2019b, WIDOA 2013b, USCB 2018).

The majority of the Project site is located in Jefferson County, Block Group 2, Census Tract 1006.02. Population in this block group decreased 1.9 percent (from 1,917 to 1,881) between 2000 and 2019. Population in Block Group 2, Census Tract 1007, which contains a small portion of the Project site, increased 2.4 percent (from 759 to 777) during the same period (USCB 2019b, USCB 2000).

3.11.1.3 Housing

Table 3.11-2 shows the total number of housing units (35,818) in Jefferson County in 2019. The number of occupied and vacant units was 32,965 and 2,853 respectively. The rental vacancy rate was 8 percent, lower than Wisconsin (12.5 percent) and the nation (12.1 percent). The median home value was $190,400, greater than the state ($180,800) but less than the nation ($217,500) (USCB 2019d).

Table 3.11-2. 2019 Housing Data

Housing	United States	Percent	Wisconsin	Percent	Jefferson County	Percent
Total housing units	137,428,986		2,694,527		35,818	
Occupied housing units	120,756,048	87.9	2,358,156	87.5	32,965	92.0
Vacant housing units	16,672,938	12.1	336,371	12.5	2,853	8.0
Owner Occupied	77,274,381	64.0	1,580,939	67.0	23,126	70.2
Renter Occupied	43,481,667	36.0	777,217	33.0	9,839	29.8
Home Value Median (dollars)	217,500	--	180,600	--	190,400	--
Rent Median (dollars)	1,062	--	856	--	857	--
Moved in 2017 or later	12,473,785	10.3	237,788	10.1	2,640	8.0

Source: (USCB 2019d)

3.11.1.4 Economic Base

Employment and industry trends are presented in Table 3.11-3. In 2019, Jefferson County had a total employment of about 45,503 jobs. Approximately 3.6 percent were employed in farming, above both the national level of 1.3 percent and the state level of 2.3 percent. Manufacturing provided 20.9 percent of the jobs, more than the nation (6.7 percent) and the state (13.3 percent) (BEA 2020a). The 2019 unemployment rate for Jefferson County was 3.1 percent, lower than the state (3.3 percent) and nation (3.7 percent) (BLS 2021a, BLS 2021b).

Table 3.11-3. Employment and Industry Trends

Area	Total Employment (number of jobs)	Farm (%)	Manufacturing (%)	Retail Trade (%)	Government (%)
Jefferson County	45,503	3.6	20.9	10.6	9.4
Wisconsin	3,753,460	2.3	13.3	9.8	11.6
United States	20.,809,500	1.3	6.7	9.4	12.1

Source: (BEA 2020a)

Table 3.11-4 presents 2019 per capita personal income. Jefferson County's per capita income of $47,152 was 83.5 percent of the national average of $56,490 and less than the state average of $53,227 (BEA 2020b).

Table 3.11-4. 2019 Per Capita Personal Income Data

Area	Per Capita Personal Income	Percent of US
Jefferson County	$47,152	83.5
Wisconsin	$53,227	94.2
United States	$56,490	100.0

Source: (BEA 2020b)

3.11.1.5 Tax Revenue

Wisconsin gets a large share of its revenue from property tax and income tax, and a smaller share from sales and excise tax, and corporate income tax (Cornelius 2011). Unlike many other states, there is no standard deduction, personal exemptions, or dependent deductions resulting in high income tax rates relative to other states (tax-rates.org 2021). Wisconsin levies a 5 percent sales tax on most purchases. Jefferson County levies a sales tax rate of 0.5 percent for a total local sales tax rate was 5.5 percent (sale-tax.com 2021). Property taxes are collected on a county level. In Jefferson County, property tax is an average of 1.7 percent of the property's assessed fair market value.

3.11.1.6 Community Cohesion and Displacement of People

Table 3.11-2 indicates that owner-occupied housing in Jefferson County was 70.2 percent, higher than the state (67.0 percent) and the nation (64.0 percent). The percent of households that moved since 2017 was 8 percent in Jefferson County, lower than the state (10.1 percent) and the nation (10.3 percent) (USCB 2019d).

3.11.1.7 Environmental Justice

The intent of EO 12898, EO 14008, and related directives and regulations is to ensure that low-income and minority populations do not bear a disproportionate burden of negative effects resulting from Federal actions. While Badger State Solar is not subject to these EOs, Badger State Solar typically assesses environmental justice impacts in its NEPA reviews. The CEQ has provided guidance for addressing environmental justice in *Environmental Justice: Guidance under the National Environmental Policy Act* (CEQ 1997).

In identifying minority and low-income populations, the following CEQ definitions of minority individuals and populations and low-income populations were used:

- *Minority individuals.* Individuals who identify themselves as members of the following population groups: American Indian or Alaskan Native, Asian, Native Hawaiian or Other Pacific Islander, Black, Hispanic, or two or more races.
- *Minority populations.* Minority populations are identified where (1) the minority population of an affected area exceeds 50 percent or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. For the purposes of this analysis, the “meaningfully greater” threshold is defined as any block group minority population which is 20 percent greater than the minority population percentage in the county.
- *Low-income populations.* Low-income populations in an affected area are identified with the annual statistical poverty thresholds from the US Census Bureau’s Current Population Reports, Series P-60, on Income and Poverty. In this analysis, low-income populations are identified where (1) the population of an affected area exceeds 50 percent low-income based on the Census data or (2) the percentage of low-income population in the affected area is greater than 20 percent of the low-income population percentage in the county.

According to CEQ guidance, US Census data are typically used to determine minority and low-income population percentages in the affected area of a project in order to conduct a quantitative assessment of potential environmental justice impacts. The geographic unit used in the analysis to identify any environmental justice communities of concern is the census block group. For the purposes of this analysis, a census block

group constitutes an environmental justice community if one of the two criteria described above for either minority or low-income populations are met.

Minority Population

The analysis for minority populations in the region of interest (ROI) followed the CEQ guidance for identifying minority populations. Information was derived from the 2015-2019 American Community Survey 5-Year Estimates.

Table 3.11-5 presents the results of the minority population analysis for the area of interest. In 2019, minorities constituted 12.1 percent of the total population in Jefferson City and 10.4 percent of the total population in Jefferson County. Minority populations in block groups contained in the ROI ranged from 3.7 percent to 5.8 percent (USCB 2019a). Based on this analysis, residents of the block groups do not constitute a minority population. The percent minority does not exceed 50 percent of the total block population nor 20 percent greater than the comparable county minority population.

Table 3.11-5. 2015-2019 American Community Survey Minority Population Data

Area	Total Population	Minority Population	Percent Minority Population
Block Group 2, Census Tract 1006.02, Jefferson County, Wisconsin	1,881	110	5.8
Block Group 2, Census Tract 1007, Jefferson County, Wisconsin	777	29	3.7
Jefferson City, Wisconsin	7,991	970	12.1
Jefferson County, Wisconsin	84,701	8,804	10.4
Wisconsin	5,790,716	1,085,117	18.7
United States	324,697,795	127,597,422	39.3

Source: (USCB 2019a)

Low-income Populations

The analysis for low-income populations in the ROI followed the CEQ guidance for identifying low-income populations. Information was derived from the 2015-2019 American Community Survey 5-Year Estimates.

Table 3.11-6 present the results of the low-income population for the area of interest. In 2019, 7.1 percent of the population in Jefferson City and 8.3 percent of the population in Jefferson County had an income below the poverty level (USCB 2019c). A total of 5 percent of the population of Block Group 2, Census Tract 1006.02 and 2.3 percent of the population in Block Group 2, Census Tract 1007 had an income below the poverty level in 2019. Poverty levels in both Block Groups were below the state average of 11.3 percent (USCB 2019c). Based on this analysis, residents of the block groups in the area of the Project site are not considered a low-income population. The percentage of

individuals living below the poverty level does not meet either the 50 percent or meaningfully greater criteria.

Table 3.11-1. 2019 Poverty Level Data

Area	Total Population	Persons Below Poverty Level	Percent of Persons Below Poverty Level
Block Group 2, Census Tract 1006.02, Jefferson County, Wisconsin	1,849	92	5.0
Block Group 2, Census Tract 1007, Jefferson County, Wisconsin	771	18	2.3
Jefferson City, Wisconsin	7,665	541	7.1
Jefferson County, Wisconsin	81,518	6,800	8.3
Wisconsin	5,642,353	639,160	11.3
United States	316,715,051	42,510,843	13.4

Source: (USCB 2019c)

3.11.2 Environmental Consequences – Socioeconomics and Environmental Justice

This section describes the potential impacts to socioeconomic resources and environmental justice should the Proposed Action or No Action Alternative be implemented. Social and economic issues considered for evaluation within the impact area include change to current and projected population levels, change in expenditures for goods and services, and short-term or long-term impacts on employment and income.

3.11.2.1 No Action Alternative

Under the No Action Alternative, RUS would not fund the Proposed Action. No Project-related changes to population and job growth would occur. Current employment trends in the area would likely continue with most of the employment in the existing economic sectors of manufacturing and government. As there are no identified minority or low-income populations within the Project site or vicinity, there would be no disproportionately high and adverse direct or indirect impacts on minority or low-income populations in association with the No Action Alternative.

3.11.2.2 Proposed Action Alternative

Implementation of the Proposed Action would entail a variety of operation and maintenance related activities and would directly affect employment, industry, and commerce. The direct impact to the economy associated with construction activities is expected to be short-term and beneficial to the local economy. The implementation of the Proposed Action would employ up to approximately 300 full time equivalent construction workers for approximately 14 months. Approximately 50 percent of the

construction workforce is expected to come from local sources. At least a portion of the construction workforce is likely already employed on similar projects.

Economic benefits associated with the Proposed Action include the purchase of materials, equipment, and services and a temporary increase in employment and income. This increase would be local or regional, depending on where the goods, services, and workers were obtained. It is likely some construction materials and services would be purchased locally in Jefferson County, as well as in adjacent counties and cities.

Indirect employment and income impacts would result from expenditure of the wages earned by the workforce involved in construction activities, as well as the local workforce used to provide materials and services. Materials, equipment, and services may be purchased locally in Jefferson County as well as in adjacent counties and the Watertown-Fort Atkinson, WI metropolitan area. Revenue generated by income tax and sales tax from new workers associated with the construction activities would benefit the local economy. However, given the relatively small magnitude of the anticipated workforce, this impact is considered to be negligible relative to the size of the local economy.

Operation of the Proposed Action would have a small positive impact on employment in the counties. One or two employees would visit the Project site as needed for scheduled/preventative maintenance and for unscheduled maintenances or outages. Once construction is complete, Badger State Solar estimates that there would be between three and five full time personnel needed for operations and maintenance of the facility. Grounds maintenance and other specific contracts for Project operation would most likely be local and ongoing on a regular basis.

Badger State Solar would mitigate impacts to line-of-sight communications should landowners show disruption to broadcast communications post construction. Therefore, individual impacts to landowner communications would be minimized.

Overall, socioeconomic impacts for the operation of the Project are anticipated to be positive and long-term, although small relative to the total economy of the region. The local tax base would increase from construction of the solar energy farm would be most beneficial to the Jefferson County area. Additionally, the local government would not have to provide any of the traditional government services, such as water and sewer, typically associated with a large capital investment.

Strategic Economic Research, LLC conducted an economic impact analysis of the Proposed Action (Appendix N) using the latest Jobs and Economic Development Impacts PV model, an industry standard methodology for studying direct, indirect, and induced effects of the Project on jobs, wages, and the economy (Loomis 2019). Table 3.11-7 presents the projected jobs, earnings, and production output estimates that

would result from implementation of the Proposed Action in Jefferson County and the State of Wisconsin.

Table 3.11-2. Jobs, Earnings, and Production Output Estimates for the Proposed Action

Factor	Jefferson County	State of Wisconsin
New local jobs during construction	69	498
New local long-term jobs	8.8	12.6
New local earnings during construction	Over $2.6 million	Almost $29.5 million
New local long-term earnings	Over $446,000	Almost $683,000
New local production output during construction	Over $7.0 million	Over $45.5 million
New local long-term production output	Over $887,000	Over $1.5 million

Source: (Loomis 2019)

In addition to the beneficial jobs, earnings, and production output, the analysis estimates that Jefferson County would receive nearly $350,000 new annual taxes. The Townships of Jefferson and Oakland would also receive almost $250,000 new annual taxes (Loomis 2019).

Leasing of agricultural lands for the solar facility also generates a beneficial economic impact by generating a higher revenue for the total acreage. Loomis concluded that either the price of crops or the total yield per acre for either corn or soybeans would have to increase significantly to exceed the income generated by the solar lease. For example, the price of corn would have to rise to $14.17 per bushel (in 2019 prices were $3.41 per bushel), or alternatively, yields of corn would have to rise to 418 bushels per acre (in 2019 yields were 174 bushels per acre). The price of soybeans would have to rise to $49.25 per bushel (in 2019 prices were $8.58 per bushel), or alternatively yields of soybeans would have to rise to 132 bushels per acre (in 2019 yields were 47 bushels per acre) (Loomis 2019).

According to the CEQ, adverse health effects to be evaluated within the context of environmental justice impacts may include bodily impairment, infirmity, illness, or death. Environmental effects may include ecological, cultural, human health, economic, or social impacts. Disproportionately high and adverse human health or environmental effects occur when the risk or rate of exposure to an environmental hazard or an impact or risk of an impact on the natural or physical environment for a minority or low-income population is high and appreciably exceeds the impact level for the general population or for another appropriate comparison group (CEQ 1997).

The social relations between members of a community, and the quality and quantity of their interactions are unlikely to be affected by the Proposed Action. The percentage of owner-occupied housing units is relatively high, and turnover since 2017 is relatively low. Regardless of the current state of the communities in the geographic area of interest, should all construction workers come from outside the area it is unlikely that,

the influx of up to 300 new residents to the area would have a potentially significant effect on the current social structure and community cohesion.

No minority or low-income populations have been identified in Jefferson County; therefore, there would be no disproportionate effects to environmental justice communities in association with the Proposed Action. Based on the analysis of impacts for all resource areas presented in this EIS, it was determined that there would be no significant adverse health impacts on members of the public or significant adverse environmental impacts on the physical environment (water, air, aquatic, and terrestrial resources), social impacts and socioeconomic conditions.

4.0 OTHER REQUIRED CONSIDERATIONS

This chapter summarizes the anticipated adverse environmental impacts of the Proposed Action and considers the relationship between short-term uses and long-term productivity and whether the Project makes irreversible and irretrievable commitments of resources. This chapter also considers the cumulative impacts in relation to other ongoing or reasonably foreseeable proposed activities within the Project area.

4.1 Unavoidable Adverse Impacts

Unavoidable adverse effects are those impacts that cannot be avoided by implementation of the Proposed Action (40 CFR 1500.2(e)). Unavoidable adverse impacts must be mitigated to reduce the adverse effects if possible. This section describes the unavoidable adverse effects related to the Proposed Action.

Where feasible, mitigation measures would be incorporated into the facility planning and design to substantially eliminate the adverse impacts where possible. Adverse impacts that can be reduced but not eliminated would be unavoidable. Mitigation measures would be used for unavoidable adverse impacts. Most unavoidable adverse impacts would occur during the construction and decommissioning phases of the Proposed Action and would be temporary.

Unavoidable adverse effects related to Proposed Action construction and decommissioning would last only as long as the construction period, and would include the following:

- Soil compaction, erosion, vegetation degradation, and stream sedimentation;
- Disturbance to wetland buffer vegetation and soil;
- Disturbance to and displacement of some species of wildlife;
- Disturbance to nearby residents;
- Traffic delays in some areas; and
- Minor air quality impacts due to fugitive dust.

Unavoidable adverse effects related to Proposed Action operations would last only as long as the useful life of the solar facility (an expected 40 years) and would include the following:

- The addition to the visual landscape of solar panels and associated facilities.
- Habitat fragmentation.
- Adverse impacts to wildlife and wildlife habitat (including special status species) due to Project-related changes to waterways and wetlands and the removal of trees and other vegetation.

Mitigation measures such as avoidance, minimization, and use of BMPs would be used to eliminate or minimize unavoidable adverse impacts from solar facility development

and operations. Implementation of the Proposed Action would not result in significant unavoidable adverse impacts.

4.2 Irreversible and Irretrievable Commitments of Resources

This section describes the irreversible and irretrievable commitments of resources related to the Proposed Action. Irreversible or irretrievable commitment of resources refers to impacts on or losses of resources that cannot be recovered or reversed (40 CFR 1502.16). Irretrievable denotes the loss of production or use of natural resources, while irreversible denotes the loss of future resource options. For example, with the conversion of farmland to other non-agricultural uses, the agricultural production loss is irretrievable, but not irreversible if the farmland is restored for future agricultural uses. Therefore, while the conversion of the Project site to utility scale solar power use would not be irreversible since at the end of the useful life of the Project, agricultural uses could be resumed.

Resources that are irreversibly or irretrievably committed to a project are those that are used on a long-term or permanent basis. This includes the use of non-renewable resources such as metal and fuel, and natural or cultural resources. These resources are irretrievable in that they would be used for the Proposed Action when they could have been used for other purposes. Human labor also is considered an irretrievable resource. Another impact that falls under this category is the unavoidable destruction of natural resources that could limit the range of potential uses of that particular resource. Implementation of the Proposed Action would involve human labor for both construction and operations. Construction and operation of the Proposed Action would require the irreversible and irretrievable consumption of metals and minerals for the manufacturing of the panels and associated equipment and of fuel, oil, and lubricants for the operation and maintenance of equipment. Implementation of the Proposed Action would not result in significant irreversible or irretrievable commitment of resources

4.3 Relationship between Short-Term Use of the Environment and the Maintenance and Enhancement of Long-Term Productivity

This section discusses the relationship between short-term uses of the environment and its effect on long-term productivity. NEPA requires an analysis of the balance or trade-off between a Proposed Action's short-term impacts on the environment and the effects that these impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment (40 CFR 1502.16). Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one development site reduces future flexibility in pursuing other options or that using a parcel of land or other resources often eliminates the possibility of other uses at that site.

Short-term, effects on the environment would primarily involve construction activity for development of the solar facility. Unavoidable adverse impacts are described and

discussed in Section 4.1. Following the useful life of the proposed solar facility, the facility would be decommissioned and the area could be returned to pre-construction uses. The Proposed Action would not result in permanent losses to maintenance or enhancement of long-term productivity.

4.4 Cumulative Effects Analysis

Cumulative impacts are defined as the incremental effects of the Proposed Action when considered together with other past, present, and reasonably foreseeable future actions regardless of the actors. Chapter 3 presents information about past and present environmental conditions, as well as future trends, where appropriate. This chapter addresses the cumulative impacts of the Proposed Action and any reasonably foreseeable actions in the vicinity outside the scope of this Project.

Desktop research of potential past, present, and future actions in the vicinity of the Project area was conducted. Resources examined included:

- County government websites;
- Local and regional news sources;
- Wisconsin Department of Transportation (WDOT) and Jefferson County website records, including planning commission meetings, city meeting minutes, and public notices.

4.4.1 Foreseeable Projects

4.4.1.1 Other Solar Projects

In addition to the Proposed Action, there are several other solar projects that are planned or in development in Jefferson County and surrounding counties (Alliant Energy 2021). Most notable is another solar project that is being developed by Ranger Power, the Crawfish River Solar Project, on land adjacent to the Project site. The Crawfish River Solar Project is a proposed 75-MW solar project on 500-acres of land in the City of Jefferson. Construction is expected to get underway in the fall of 2021 and complete in late 2022. The Badger State Solar and Crawfish River Solar Projects are two separate projects, but would utilize similar equipment, have similar construction schedules/plans, and have similar operations (Ranger Power 2020).

While there are several solar projects being planned or in development in counties adjacent to Jefferson County, the only other solar project within a 30-mile radius of the Proposed Action is the North Rock Solar Project. This 50-MW project is a 473-acre site in Town of Fulton in Rock County, 18 miles southwest of the Proposed Action. Construction is currently underway and is expected to be compete in summer 2023 (Alliant Energy 2021).

4.4.1.2 Wisconsin Department of Transportation Projects

The WDOT has several projects scheduled for the years 2022 through 2026 in Jefferson County within the Project site vicinity. Table 4.1-1 contains details regarding the projects. It is unlikely that all of these projects would be active at the same time. However, traffic in the area may increase if several projects were ongoing in conjunction with the construction of the proposed solar farm.

Table 4.4-1. Wisconsin Department of Transportation Scheduled Projects

Project Location	Project Type	Timeline
South Main Street Bridge over Rock River, City of Jefferson, Jefferson County	Bridge replacement	2022
US 12 Reconstruction (Buckingham Road to County M) City of Fort Atkinson to Whitewater, Jefferson County	Road reconstruction and widening	2022
US 12 (Madison Avenue to County M), City of Fort Atkinson, Jefferson County	Repaving and road widening	Summer 2023
US 12 Robert Street Bridge over Rock River, City of Fort Atkinson, Jefferson County	Bridge replacement	Spring-Fall 2023
WIS 89 (E. Blackhawk Drive to US 18), Fort Atkinson, Jefferson County	Road improvement	2025, with potential advancement to 2024
WIS 106 (0.01 miles east of Edgewater Road to County CI), Fort Atkinson, Jefferson County	Repaving	2026, with potential advancement to 2022

Source: (WDOT 2021)

4.4.2 Cumulative Effects of the Proposed Action and Foreseeable Future Projects in the Area

Minor or no impacts to soils and geology, air quality, acoustic environment (noise), water resources (including groundwater and surface water), biological resources (including vegetation, wetlands, riparian areas, floodplains, wildlife, fisheries and aquatic resources, and threatened and endangered species), land resources (including prime farmlands), visual resources, transportation, cultural resources and historic properties, public health and safety, and socioeconomics and environmental justice are anticipated due to the Proposed Action. These resources are discussed in the following sections with respect to cumulative impacts. Foreseeable solar and transportation projects, other than the adjacent Crawfish River Solar Project are separated in space and time, and there would be minor or no cumulative impacts from the Proposed Action when considered with potential impacts from other foreseeable projects.

4.4.2.1 Soils and Geology

Cumulative impacts from soil erosion and runoff could occur in the vicinity of the Proposed Action and Crawfish River Solar project. However, both projects would be expected to utilize stormwater controls, plans, and BMPs in accordance with the

SWPPP. Thus, while both projects are potentially temporally and spatially proximate, use of these controls and measures would minimize the temporary cumulative impacts. Transportation projects would also be required to implement similar erosion control BMPs so as not to impact water resources. Additionally, the transportation projects are not in immediate proximity to the Proposed Action. Therefore, overall cumulative impacts to soils should be temporary and minor. Long-term soil quality could improve from the conversion of agricultural land to solar development. There would be less regular disturbance to the soil, which would result in less erosion and sedimentation. Other geologic resources would not be impacted by the Proposed Action and therefore would not be expected to result in cumulative impacts when combined with other projects.

4.4.2.2 Water Resources

Potential additional solar development in the future could result in increased losses of important riparian habitat associated with other waterbodies in the area. Rigorous application of BMPs to prevent erosion and sedimentation (such as those in accordance with the SWPPP) would be expected for other forseeable solar projects and both planned solar projects in Jefferson County. Ranger is committed to avoiding and minimizing impacts to wetlands, streams, and ponds in the development of their solar projects, which would include both Badger State Solar and Crawfish River. The proximity of the Proposed Action and Crawfish River Project, as well as likely temporal proximity of the construction and operation of both projects, would contribute to potential cumulative impacts to water resources. The conversion from cropland would result in decreased disturbance to the soil and less pesticide and fertilizer use, which could result in long-term improvements to downstream water quality. Transportation projects would also be required to implement BMPs so as not to significantly impact water resources. The greater distance between the transportation projects and the solar projects also would minimize the potential for cumulative impacts. Therefore, the impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions affecting water quality, would not be significant and may be beneficial with regard to reducing the nitrification of local waterbodies.

4.4.2.3 Air Quality

While there are no global warming-related emissions associated with generating electricity from solar energy, there are emissions associated with other stages of the solar lifecycle, including manufacturing, materials transportation, installation, maintenance, and decommissioning and dismantlement. However, the discontinuation of agricultural practices in the area would result in decreased reliance on farming equipment that use petroleum-based fuels. Further, at least six of the 12 coal-fired power plants in Wisconsin are planned for retirement over the next several years. Construction and operation of solar farms in the state (including, but possibly not limited to both the Proposed Action and the Crawfish Solar Project) would replace some of the lost power generation from these coal-powered facilities. Therefore, the operation of

solar farms in the area could have a beneficial cumulative impact on air quality and GHG emissions due to the potential for reduced air pollutants in the area.

If the road construction and solar farm construction were to occur simultaneously in the same location, adverse cumulative impacts to air quality in the immediate vicinity would occur as a result of vehicle and equipment emissions and mobilization of fugitive dust. However, these projects are separated in proximity, and in some cases temporally as well and, therefore, the temporary cumulative impacts would be minor.

4.4.2.4 Acoustic Environment

Noise associated with the construction and decommissioning of the solar farm would be temporary and would not significantly raise noise levels in the vicinity of the Project area (Section 3.4). If additional solar farms and/or transportation projects were occurring nearby at the same time, adverse cumulative impacts to noise levels could occur, but they would be temporary. The planned transportation projects are generally small and related to roadway repair and are not immediately proximate to the Project site. Noise also attenuates with distance. Therefore, if cumulative impacts to noise were to occur, they would be temporary and insignificant.

4.4.2.5 Biological Resources

Agricultural development is the primary driver for impacts to biological resources (vegetation, wildlife, fisheries, and aquatic resources) in this part of Jefferson County. To provide a significant amount of electrical energy, solar farms require large tracts of land. Most of the areas viable for solar or other development have already been cleared for agriculture, but incremental habitat loss, fragmentation, and degradation are still a threat to biological resources. The construction of additional solar farms in the area, in particular the immediately adjacent Crawfish Solar Project, would add to this threat to biological resources. However, similar to the Proposed Action, it is assumed BMPs would be used (potentially similar to the avoidance measures described in Section 2.5.2). Additionally, Federal and state permits would be required for all construction projects. Adherence to permit requirements as well as application of BMPs would minimize potential cumulative adverse effects associated with the construction of solar projects. Transportation projects are planned on already developed land. As a result, no adverse cumulative effects to biological resources are expected from the construction of the Proposed Action in conjunction with the transportation projects.

Based on the site plans, 10 wetlands would be impacted from installation of solar panels during the Proposed Action; however, no permanent wetland impacts are anticipated (Section 3.5.2). The construction of additional solar projects in the area could add to incremental loss of wetlands, but it is expected that impacts to wetlands during the construction of cumulative projects would be permitted under applicable Federal and state requirements and carried out in accordance with WPDES. As a result, minimal adverse cumulative effects to wetlands and important riparian habitat associated with

other watersheds are expected from the construction of the proposed solar facility when combined with cumulative projects in the area.

Based on the site plans, no floodplains would be impacted by the Proposed Action; therefore, it would not contribute to potential cumulative impacts on floodplains as a result of other reasonably foreseeable projects (e.g., solar and transportation) in the area and the planned transportation projects are also on previously developed land. As a result, no adverse cumulative effects to floodplains are expected from the construction of the proposed solar facility when combined with other actions.

4.4.2.6 Land Resources

Land use in the area is generally agricultural. Although the alteration of the Project site from agricultural to solar use is considered to be a farmland conversion by the USDA, solar development does not prohibit the land from being farmed in the future. However, if the Proposed Action is implemented, it may encourage future conversions in the area (e.g., solar, commercial, residential), thereby changing the general landscape over time. Because Wisconsin is in the process of encouraging solar farms as a form of alternative energy, including funding such projects, more agricultural land in the area may be converted to solar farms. The loss of additional actively farmed land use to other solar farms in the area (including the adjacent Crawfish Solar site) may adversely impact the amount of available prime farmland. These additional potential projects would have to be assessed as they are approved and funded. Construction of additional solar projects in the area could add to the incremental conversion of land use, but given the overall amount of farmland available in the county and the state, it is expected that there would be minimal adverse impacts on overall land use in the area. The planned transportation projects in the area are on already developed land and would not contribute to cumulative impacts on land use.

4.4.2.7 Visual Resources

As described above in Section 3.7, the construction and operational activity associated with the Proposed Action would have a minor impact on the visual character of the immediate Project area. This would result in a cumulative effect on visual resources in association with the adjacent Crawfish River Solar Project. Also, as previously mentioned, at least six of the 12 coal-fired power plants in Wisconsin would be retired over the next several years and the goals of the Dairyland Powers' Sustainable Generation Plan includes increasing renewable solar power generation 30 percent by 2030 (DPC 2021). Therefore, larger amounts of farmland in the vicinity of the Proposed Action and throughout the state could be converted to an industrial appearance due in part to construction of solar farms. However, these potentially cumulative solar projects would likely be separated in both time and space and the use of setbacks and visual screens around the Project site and cumulative solar project sites constructed in Wisconsin would minimize potential impacts to visual resources (Great Plains Institute 2020). Therefore, minimal cumulative effects to visual resources would be expected as

a result of the Proposed Action. The transportation projects in the vicinity of the Proposed Action are on already developed land. While there could be temporary, minor impacts to visual resources during construction of these projects, the distances between these projects and the solar projects would not be expected to contribute to adverse cumulative impacts to visual resources.

4.4.2.8 Transportation

Construction of the Proposed Action, other solar facilities in the vicinity of the Project area, and WDOT transportation projects near the Project site in Jefferson County may occur simultaneously and increase traffic from the additional construction vehicles and commuters, ultimately causing cumulative impacts to transportation. Traffic impacts could include slowdowns and decreases in level of service in the area. Heavy equipment, trucks delivering supplies and hauling debris, and construction worker traffic may cause cumulative traffic delays on area roads. Additionally, large equipment on relatively small rural roads may cause damage to the roads if not carefully managed. Once construction of these projects is complete, traffic would return to normal levels, as a large operational workforce is not anticipated for the Proposed Action or other solar projects. Additionally, Badger State Solar, and presumably other solar projects within Jefferson County, would coordinate with county officials and regulators, as appropriate, to assure construction traffic does not place any undue burdens on the community. Therefore, cumulative impacts to transportation in the immediate vicinity would be minor and temporary.

4.4.2.9 Cultural Resources

None of the identified archaeological resources within the Project APE were recommended as eligible for the NRHP. Additionally, no archaeological resources identified in adjacent land being used by the Crawfish River Solar Project were recommended as eligible for the NRHP (Edwards et al. 2019). While the NRHP-eligible William Eustis House is adjacent to the Project site, there would be no adverse effect to this historic property. Impacts from other foreseeable solar projects would be addressed and appropriately managed under the Section 106 review process should these projects include a federal nexus. The planned transportation projects are on already disturbed and developed land; therefore, impacts cultural resources would be expected to be minor or negligible. Considering the locations and types of reasonably foreseeable future projects, the only known historic property near the Proposed Action – the William Eustis House – is unlikely to experience additional effects from other reasonably foreseeable projects that would result in a cumulative adverse effect. Therefore, no significant cumulative impacts to cultural resources would be expected to occur as a result of the Proposed Action in conjunction with other projects in the area.

4.4.2.10 Public Health and Safety

Potential temporary impacts to health and human safety would be related to construction work accidents and traffic accidents (Section 3.10). An increased risk of accidents could result from the possible concurrent solar and transportation projects in the area. Therefore, adverse cumulative impacts to health and human safety are possible. The solar and transportation projects may be separate by both time and space which minimizes potential for cumulative impacts. As all projects would be managed according to OSHA regulations and would employ safety BMPs and other safety plans (e.g., SPCC Plan, staggered deliveries), cumulative impacts would be insignificant and temporary. Badger State Solar would make available stray voltage testing for all agricultural confined animal operations within one-half mile of the solar farm Project area to measure and minimize potential impacts to such operations. Cumulative impacts from stray voltage from the Project site and nearby solar projects are not anticipated because solar power plants have protection systems to isolate faults within the facility and, thus, do not represent increased risk factors for stray voltage.

The construction and operation of the Project site, Crawfish River Solar Project, and the transportation projects would all involve quantities of chemicals, fuels, oils, and fluids, and could all result in inadvertent spills, and generation of potentially hazardous and non-hazardous wastes. However, all of these projects would have processes for hazardous materials and waste management in place during Project construction, operation, and decommissioning. All wastes and materials would be handled appropriately in accordance with all Federal, state, and local regulations. Therefore, potential cumulative impacts associated with hazardous wastes and materials would be minor.

4.4.2.11 Socioeconomics and Environmental Justice

During construction and decommissioning, the Project site is expected to result in minor beneficial impacts to socioeconomics in the area due to increased employment and possible temporary increase in population from out-of-town workers. If the additional proposed solar facilities and transportation projects would occur (such as the Crawfish River Project) within the same general time, additional beneficial cumulative impacts to socioeconomics could occur due to additional employment opportunities; however, it is also possible that many of these jobs would be filled by existing employees of construction firms, thus the impacts would be minor. These impacts would also be temporary; once construction is complete, a relatively small number of people would be employed during operation of the potential solar facilities in the area.

Disturbance to nearby residents as discussed in Section 4.1 related to temporary and and minor traffic, air quality and noise impacts during construction, operations and decommissioning of the Proposed Action would affect the general population, and are not expected to disproportionately affect minority and low-income populations. No environmental justice communities have been identified in Jefferson County; therefore,

there would be no disproportionately high or any adverse direct or indirect cumulative impacts on minority or low-income populations due to human health or environmental effects resulting from the Proposed Action or other cumulative projects in the area.

5.0 LIST OF PREPARERS

Table 5-1 summarizes the expertise and contribution made to the EA by the Project team.

Table 5-1. Environmental Assessment Project Team

Name	Education	Years of Experience	Project Role
Bobbie Hurley	M.A., Chemistry; B.S., Chemistry; B.S., Biology	30	Project Manager
Carol Butler Freeman, PG	M.S., Geological Sciences; M.S., Space Studies; B.S., Geology	25	Deputy Project Manager / QA Manager
Larry Neal	M.S., Biology B.S., Botany	46	Deputy Project Manager
Kursten Anderson	Ph.D., Environmental Toxicology B.S., Marine Science	6	Aquatic Ecology, Wetlands, Public and Occupational Health & Safety
Anneliesa Barta	MBA Finance	12	Air Quality, GHG Emissions, Socioeconomics, Environmental Justice
Kristen Beckhorn	Ph.D. Environmental Toxicology M.S. Environmental Toxicology B.S. Environmental Science, Chemistry	10	Visual Resources, Noise
Delia Halliman	M.S. Environmental Toxicology B.S. Animal and Veterinary Sciences	4	Air Quality, Acoustic Environment
John Majsztrik	Ph.D. Plant Science and Landscape Architecture M.S. Forest Biotechnology B.S. Biology	11	Surface Water, Transportation, Natural Areas, Parks, and Recreation
Molly Notestine	M.S. Plant, Soil and Insect Sciences B.S. Resource Ecology Management	16	Wetlands and Riparian Areas, Wildlife Resources, Fisheries and Aquatic Resources, Special Status Species
Keith Owens	B.S. Geology	33	Geology and Seismology, Groundwater
Katherine Winterstein	B.S., Anthropology	5	Cultural Resources

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