# APPENDIX D
# SITE SELECTION STUDY

# Badger State Solar, LLC – Site Selection Study

February 3, 2021

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**FIGURES**

# Executive Summary

Badger State Solar, LLC ("Badger State" or "Project") is seeking approvals and authorizations required to construct, install, operate, and maintain a 149 Megawatt (MW) Alternating Current (AC) solar energy generating facility.

On May 13, 2019, pursuant to Wis. Stat. § 196.491 and Wis. Admin. Code chs. PSC 4 and 111, Badger State Solar, LLC (Badger State) filed with the Public Service Commission of Wisconsin (PSCW) an application for a Certificate of Public Convenience and Necessity (CPCN) to construct a new solar photovoltaic (PV) electric generation facility. The PSCW issued an Order approving the CPCN application subject to conditions issued in the Final Decision on February 26, 2020. The Badger State CPCN application and all relevant decision documents may be found in docket 9800-CE-100 at PSC Badger State Solar Project (wi.gov) and https://apps.psc.wi.gov/ERF/ERFview/viewdoc.aspx?docid=366644

Badger State is seeking federal financing for the Project from the United States Department of Agriculture Rural Utilities Service (USDA-RUS) and, at the request of RUS, prepared this Site Selection Study to outline the process by which the Project site, as approved by the PSC, was chosen.

The proposed Project would be located on approximately 1,200 acres of primarily agricultural land in Jefferson County, Wisconsin. The major components of the Project include photovoltaic (PV) panels, power conversion units (PCU), collection lines, a collector substation, and a short 138 kV generator tie line.

# 1.0 INTRODUCTION

On May 13, 2019, pursuant to Wis. Stat. § 196.491 and Wis. Admin. Code chs. PSC 4 and 111, Badger State Solar, LLC (Badger State) filed with the Public Service Commission of Wisconsin (PSCW) an application for a Certificate of Public Convenience and Necessity (CPCN) to construct a new solar photovoltaic (PV) electric generation facility. The PSCW issued an Order approving the CPCN application subject to conditions issued in the Final Decision on February 26, 2020. The Badger State CPCN application and all relevant decision documents may be found in docket 9800-CE-100 at PSC Badger State Solar Project (wi.gov) and https://apps.psc.wi.gov/ERF/ERFview/viewdoc.aspx?docid=366644.

Badger State's proposed generation facility would be a wholesale merchant plant as defined by Wis. Stat. 196.491(1)(w) and would have a generating capacity of up to 204.9 megawatts (MW) direct current (DC) and up to 149 MW alternating current (AC). The proposed Project would be located on approximately 1,200 acres of primarily agricultural land in Jefferson County, Wisconsin (Figure 1). The major components of the proposed Project include the PV panels, power conversion units (PCU), collection lines, a collector substation, and a short 138 kV generator tie line.

The proposed electric generation Project was reviewed by the PSCW for environmental impacts. Wisconsin Admin. Code ch. PSC 4, Table 3, identifies construction of a solar-powered electric generation facility as a Type III action. However, Wis. Admin. Code § 4.10 specifically provides that while Type III actions do not normally require preparation of an Environmental Assessment (EA) or an Environmental Impact Statement (EIS), an evaluation of a specific Type III proposal may indicate that preparation of an EA or EIS is warranted for that proposal. An EA was warranted for the proposed Project due to the novelty of the proposed Project in this state, as well as the size and amount of land that would be covered by the proposed Project. The environmental review focused primarily on impacts to wildlife, including rare or endangered species, aesthetics, historic resources, wetlands and waterways, and local landowner impacts. The EA concluded that approval and construction of this Project is unlikely to have a significant impact on the human environment as defined by Wis. Stat. § 1.11.

Badger State is seeking federal financing for the Project from the U.S. Department of Agriculture Rural Utilities Service (USDA-RUS) and, at the request of RUS, prepared this Site Selection Study to outline the process by which the Project site, as approved by the PSC, was chosen.

## 1.1 PROFILE OF THE APPLICANT

Badger State Solar, LLC (Applicant), will be the direct owner of the Project. The Project is being developed by Ranger Power LLC ("Ranger Power") with investment capital from D. E. Shaw Renewable Investments ("DESRI").

## 1.2 PURPOSE AND NEED FOR THE PROJECT

Ranger Power is a developer of large utility-scale solar farms and is responsible for securing land, transmission access, and permitting projects. Ranger Power seeks solar development opportunities throughout Wisconsin and other Midwestern states.

Wisconsin has an aging fleet of fossil-fuel power plants, many of which are scheduled to come offline over the next several years according to announcements by large utilities. Of the twelve coal fired power plants in operation in Wisconsin at the start of the previous decade, six have been retired or are scheduled to go offline. The more recent closure includes We Energies Pleasant Prairie Plant in Kenosha County,

Wisconsin, and the scheduled closure of Alliant Energy's Edgewater Plant in Sheboygan County in 2022. Solar is one of the lowest cost forms of new energy generation for the region, with low operating costs and no fuel costs.

The sole purpose of Ranger Power's business model is to replace load demand by local utilities that is being created by ongoing coal-fired power plant decommissioning activities with Solar Generation.

Dairyland Power Cooperative signed a Power Purchase Agreement with Badger State Solar, LLC on February 13, 2019 to purchase the power generated by the Project.

## 1.3 REQUIRED PERMITS AND APPROVALS

Table 1 summarizes the permits and approval types that are required at the federal, state, and local level for the Project. The necessary permits and approvals will be obtained before commencing construction activities.

**Table 1. Required Permits and Approvals**

| Type | Authority or Lead Agency | Regulatory Driver | Permit/ Approval Required |
|---|---|---|---|
| ***Federal Permits*** | | | |
| Permit | US Army Corps of Engineers (USACE) | Section 404 of Clean Water Act (CWA) | Yes |
| Consultation | US Fish and Wildlife Service (USFWS) | Due to assumed requirement for CWA Section 404 permit/authorization, Endangered Species Act Section 7 Consultation may be required; Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act (BGEPA) compliance will also be applicable. | Yes |
| Consultation | Federal Aviation Administration (FAA) FAA Notice Criteria Tool | Navigable Airspace Review (14CFR77.13(a)) | Yes |
| Order | Public Service Commission of Wisconsin (PSC) | Certificate of Public Convenience and Necessity | Yes |
| Permit | Wisconsin Department of Natural Resources (WDNR) | Section 401 of the CWA, Water Quality Certification and State-Regulated Wetlands (Isolated Wetland Permit) | Yes |

| Type | Authority or Lead Agency | Regulatory Driver | Permit/ Approval Required |
|---|---|---|---|
| Permit | WDNR | Wisconsin Pollutant Discharge Elimination System (WPDES)/Stormwater Runoff Permit (NR216) | Yes |
| Permit | WDNR | Wisconsin Navigable Waters, Harbors and Navigation (Chapter 30) | TBD |
| Consultation | WDNR | Wisconsin Endangered Species Law (s. 29.604, Wis. Stats.) | Yes |
| WDNR Notification Number | WDNR | Request for a Well Number Wisconsin Stats. 281.34(3) | Yes (if O&M Building includes plumbing facilities) |
| Consultation | Wisconsin State Historical Society - Historic Preservation Office (SHPO) | Cultural Resources (historical and archaeological) under Section 106 of the National Historic Preservation Act | Yes |
| Permit | Wisconsin Department of Transportation (WisDOT) | Utility permit to construct, operate or maintain a utility facility on state trunk highway s. 66.0831, 84.08, 85.15, 86.07(2)(a), 86.16, 182.017 and other applicable Wis. Stats. | Yes |
| Permit | WisDOT | Driveway/access permit s. 86.07(2) Wis. Stats. & Ch. Trans 231 Wis. Adm. Code | Yes |
| Permit | WisDOT | Oversize/overweight permit s.348.26(2), (3) Wis. Stats | Yes |
| Permit | State of Wisconsin, Division of Safety and Buildings (or Town depending on scope of building) | Wisconsin Stats. 101.63, 101.73 | Yes |
| ***Jefferson County*** | | | |
| Permit | Jefferson County Land Management and Zoning | Jefferson County Shoreland Zoning | TBD - Confirm based on final engineering. |

| Type | Authority or Lead Agency | Regulatory Driver | Permit/ Approval Required |
|---|---|---|---|
| Permit | Jefferson County Land Management and Zoning | Jefferson County Floodplain Zoning | TBD - Confirm based on final engineering. |
| Permit | Jefferson County Highway Department | Pursuant to Section 348.26(2), (3) Wisconsin State Statutes Oversize-overweight permit | Yes |
| Permit | Jefferson County Land Conservation Department | Stormwater Management and Erosion Control Plan and permit | Required by WDNR regardless |
| Permit | Jefferson County | Permit to Construct, Maintain or Repair Utilities Within Highway Right-Of-Way | Yes |
| Permit | Jefferson County Highway Department | County Highway Entrance Permit, Road Use Agreements | Yes |
| Permit | Jefferson County | Building/Construction/Electrical review | Yes |
| Permit | Jefferson County | Sanitary Permit | Yes (if O&M Building includes plumbing facilities) |
| Inspection / Approval | Town of Jefferson | Driveway access approval | Yes |
| Permit | Town of Jefferson | Sign Permit | Yes |
| Permit | Town of Jefferson | Building/Construction/Electrical and Erosion Control Permit | Yes |
| Permit | Drainage District 16 | Drainage Alteration Permit ATCP 48.34 Subchapter V | Yes |

## 1.4 COMMUNITY OUTREACH

This section summarizes the community outreach conducted to date for the Project.

**Local Residents** – Badger State has been meeting with prospective landowners, their tenants, and nearby residents since early 2017 to determine local interest in the Project and to lease land.

**Local Units of Government** – The Project has also met with local Town and County elected officials and staff to advise them of project activities, to gauge interest in a solar facility, as well as to understand permitting requirements and potential concerns:

- Jefferson and Oakland township board members;
- Jefferson County representatives (County Administration, County Board members, Land and Water Conservation Committee, Planning and Zoning, Conservationist);
- The Mayor of Jefferson City, City Administrator, and the Jefferson City Council;
- The City Administrator and City Engineer of Fort Atkinson.

**State Elected Representatives and Regulatory Agencies** – The Project has also met with state elected representatives and with staff from the Public Service Commission of Wisconsin, Department of Agriculture Trade and Consumer Protection (DATCP) and Wisconsin Department of Natural Resources (WDNR) to discuss permitting and related topics.

**Public** – In addition, the Project has engaged in outreach activities to share information and gather feedback from a broader public audience, including:

- One-on-one communication with Project neighbors and community leaders
- Presentations at public meetings of local units of government
- Meetings with representatives of the Jefferson Chamber of Commerce, Jefferson County Agribusiness Club, Jefferson County Farm Bureau, Jefferson Rotary, Jefferson County Economic Development Coalition/Thrive Economic Development, Madison Region Economic Partnership (MadREP), Wisconsin Manufacturers and Commerce, and the Wisconsin State Farm Bureau.
- Established a dedicated Website (www.badgerstatesolar.com) that provides information about the Project along with contact information.
- Maintains a local office in Jefferson, and provides meetings by appointment as well as open office hours
- Actively monitors an informational e-mail address and toll-free phone number.
- Hosted an Open House March 28, 2019, with over 100 attendees. Over 400 invitations were sent, and the list included landowners within a mile of the facility based on a list compiled by the state in 2018.
- The Project has worked with local media to facilitate coverage of plans for the Project, resulting in significant coverage in the local area, including front-page print articles in the Jefferson County Daily Union and in the Watertown Daily Times and a 20-minute on-air discussion on the WFAW Morning Magazine radio show.

**PSC Proceedings:**

Environmental Assessment public scoping meetings were held on Monday, July 1st, 2019, with one starting at 2:00 p.m. and another starting at 6:00p.m. at Jefferson County Highway Department Building, 1425 South Wisconsin Drive, Jefferson, WI. Both meetings were held in an open house format instead of a formal presentation. Staff from the Commission and DNR will have copies of the application materials and maps for the public to review. Staff can answer questions about the review process and the application. Local residents are encouraged to attend and provide comments about the Project and its environmental impacts. Those comments were considered by staff during the analysis of the Project.

Additional opportunities for public participation include the opportunity to comment on the environmental assessment of the Project, and the public hearing comment period.

On September 24, 2019, the Commission issued a Notice of Hearing to announce the date and location of the public hearing sessions. Two sessions were held on Wednesday, November 6th, 2019, with one starting at 2:00 p.m. and another starting at 6:00p.m. at the Activity Center at Jefferson County Fair Park, 503 N. Jackson Ave. Jefferson, WI.

## 1.5 FORMAT AND CONTENT OF THIS DOCUMENT

Section 2.0 describes the technical alternatives presented in the Alternatives Evaluation Study (AES) for the Project.

Section 3.0 describes the phased approach used by Badger State to select the Project site as approved by the PSC.

Section 4.0 provides a description of the proposed Project site, including Project components.

# 2.0 TECHNOLOGICAL ALTERNATIVES UNDER EVALUATION

The Project (Figure 1) has been designed to comply with all local zoning requirements. Although the PSCW had authority to permit the Badger State Solar Project, the local governments and Badger State separately pursued a Joint Development Agreement. The purpose of the agreement is to ensure that when the Project moves forward, Badger State will commit to requirements such as setbacks from residences and roads, construction requirements, infrastructure protection, and financial conditions.

Badger State's proposed generation facility would be a wholesale merchant plant as defined by Wis. Stat. 196.491(1)(w). As such, alternatives presented for generation projects within RD Instruction 1970-O Exhibit B are not considered applicable to Alternatives Evaluation Study (AES) (Stantec 2021). It is the opinion of the Applicant that the Proposed Action and the No Action Alternative are the only valid alternatives for evaluation and, therefore, those two alternatives were presented in the AES for the Project (Stantec 2021).

The Proposed Action, which includes construction of the Project (Stantec 2021), is described in detail in Section 4.0 below.

Under the No Action Alternative, Badger State would not interconnect at the American Transmission Company (ATC)-owned Jefferson 138kV substation and would not build the Badger State Project (Stantec 2021).

# 3.0 SITE SELECTION PROCESS

The site selection process for the Project is outlined in Section 1.4 of the Badger State CPCN application. All relevant decision documents may be found in docket 9800-CE-100 at PSC Badger State Solar Project (wi.gov) and https://apps.psc.wi.gov/ERF/ERFview/viewdoc.aspx?docid=366644.

The site selection process is also summarized below. Figure 2 depicts the locations of all potential sites evaluated as part of Phases 1 and 2 of the site selection process (see Section 3.2 below).

## 3.1 BASIC PROJECT REQUIREMENTS

Badger State initiated a preliminary site review to identify potential locations for development of a solar energy facility in Wisconsin. The process that Badger State follows in finding and evaluating potential project sites varies; however, the elements described below are fundamental to the process and were used in Badger State's review of potential locations in the state of Wisconsin.

The first phase of assessment evaluated electric transmission infrastructure to ensure it is sufficient to connect a project to the power grid. Existing substations and transmission lines are preferred because the cost to connect a project to the grid increases with the distance over which project-specific transmission must be built. Badger State searched for injection points that are close to major load centers and where the existing electrical infrastructure is robust to minimize the interconnection facility costs and network upgrades required for the new generating facility.

In addition, Badger State prioritized projects where open land was available adjacent to the point of interconnection, to minimize the length of high voltage transmission generation tie lines and the number of structures that support them. Finally, Badger State sought project sites with receptive potential host landowners and values working with communities that welcome solar projects and responsible economic development opportunities.

## 3.2 PHASED APPROACH TO SITE SELECTION

### 3.2.1 Phase I – Identify Substations as Points of Interconnection

The first phase of the site selection process eliminated areas of poor solar resource or other siting flaws, such as:

- Transmission and Injection Capacity – Nearby electric transmission infrastructure is necessary to connect a project to the power grid. A project substation and additional transmission lines are often necessary, however the cost required to connect a project to the grid increases with the distance over which project-specific transmission must be built. Ranger looked for points of interconnection that can handle a project typically in the range of 75-200 MWs. Ranger also primarily considered points of interconnection that are larger than 100kV which typically are better equipped to fit projects of this size.

- Land Availability – Large open areas are necessary for utility-scale solar facilities. Cities, suburbs, and areas of active residential development were eliminated in the first phase of the search for an eventual project site.

Figure 2 depicts a total of 18 substations and transmission lines evaluated during Phase 1 to determine if these sites were feasible interconnection points for a proposed solar development.

The following Phase 1 locations (Figure 2) were eliminated from further study because of their remote location and solar resource availability challenges (i.e., located in northern Wisconsin), these sites were not located near any major load centers, and each posed potential challenges to finding utility offtakers:

- 138 kV Aspen
- 161 kV Gingles
- 115 kV Hurley
- 161 kV White River
- 138 kV Champion

In addition, five sites were eliminated because of land constraints:

- 138 kV Verona – This existing substation is located adjacent to a Madison suburb, and did not have enough land in proximity to the substation to host a solar facility.
- 138 kV Dyckesville – The proximity of the site to Green Bay created land constraints, and the wooded area surrounding the existing substation further reduced the acreage of land available to host a solar facility.
- 138 kV Lost Dauphin – Residential development, as well as the presence of a waterway and associated floodplain restricted land available to host a solar facility.
- 115 kV Bay Front – Residential development as well as the proximity to Chequamegon Bay, restricted the land available to host a solar facility.
- 345 kV South Oak Creek – This site is located in a suburban area not suitable for solar development due to its close proximity to a coal fired power plant and Lake Michigan.

### 3.2.2 Phase 2 – Constraints Analysis of Feasible Sites

The second phase of the site selection process focused on areas identified as feasible during Phase 1 and included a review of the following constraints at each site. The evaluation that led to the final site selection was a mix of both quantitative and qualitative functions of these resources.

- Land Use – Large tracts of open land must be available to support the responsible siting of solar panels. Agricultural land is ideally suited for solar farms.
- Potential Host Landowners – Prospective landowners are visited to gauge interest in hosting project facilities.
- Environmental Concerns – A site suitability tool was used to screen for environmental factors including, but not limited to, wetlands (Wisconsin Wetlands Inventory (WWI) data), waterways (U.S. Geological Survey (USGS) hydrography data), trees, critical habitat, endangered species and animals, and hydric soils.
- Cultural and Historic Resources - Archaeological, cultural, and historical resources were considered during the site selection and Project design.
- Community – Badger State values working with communities that welcome solar projects and responsible economic development opportunities.

- Constructability – Topography (elevation and slope), as well as soils and subsurface geology were reviewed at a desktop level. Detailed field analyses were performed later in the development process.
- Road Infrastructure – Highways and roads within the proposed project area were reviewed for compatibility with large construction vehicles and delivery trucks. Main highways feeding into the area from major ports or rails were also considered for delivery of panels and other components.

In general, Ranger takes an avoidance approach to siting of solar development. This involves avoiding floodplains, minimizing impacts to wetlands, complying with timing restrictions, and avoiding any cultural or historical features to the extent feasible.

Eight sites were evaluated during Phase 2 of the site selection process (Figure 2). Each site, and the results of the Phase 2 analysis are described below. Figure 3 provides WWI data, USGS hydrography data (i.e., streams/waterways), and Federal Emergency Management Agency (FEMA) floodplain data for each of the sites evaluated in Phase 2.

**Cambridge 138 kV (Dane County) (Figure 3)**

This site was eliminated from consideration for the following reasons:

- Land control limitations posed by the presence of floodplain (i.e. a fatal flaw) (Figure 3) would make it difficult to gain control of more than 500 acres of viable land in close proximity to the substation.
- The presence of rivers and streams, as well as waterbodies, wetlands, and woodlands in close proximity to the substation.
- The existing substation is within one mile of the Village of Cambridge which hosts a dense residential population.

**WPS Greenleaf 138 KV (Brown County) (Figure 3)**

This site was eliminated from consideration for the following reasons:

- Land control constraints posed by the presence of floodplain and a flood zone (Figure 3) would make control of sufficient acreage of land outside of fatal flaw zones difficult.
- The presence of floodplain, as well as wetlands, woodlands, and waterways, creates little opportunity for viable land use near the substation.
- The presence of a state trunk highway adjacent to the substation posed further land constraints beyond those already identified.

**London 138 kV (Dane County) (Figure 3)**

This site was eliminated from consideration for the following reasons:

- Land control limitations posed by the presence of floodplain throughout the potential project area (Figure 3) would have made it difficult to gain control of more than 500 acres of viable land in close proximity to the substation.
- The presence of rivers and streams, as well as waterbodies, wetlands, and woodlands in close proximity to the substation.
- The existing substation is located approximately four miles from the Village of Deerfield which hosts a dense residential population.

**ATC North Monroe 138 kV (Green County) (Figure 3)**

Ranger Power commissioned a third-party load flow analysis (i.e., injection study) to determine if there would be significant Network Upgrades required besides a typical substation expansion to accommodate the Project at the North Monroe substation. The load flow analysis uses base cases from MISO's Generator Interconnection Queue process. This process provides a method for generation planners and developers to submit new generation interconnection projects into the Queue for compliance with North American Electric Reliability Corporation (NERC) standards related to facility additions and determine responsibility to fund upgrades to accommodate the generator.

The load flow analysis considers the location of the point of interconnection in the Independent System Operator's footprint, proximity to load (which can help avoid constraints). Load flow simulations are performed to test the project's transmission impacts and potential triggers for required upgrades.

Given the results of the injection study, the North Monroe location was eliminated from consideration because it would have required significant upgrades to accommodate the Project.

**ATC Oak Ridge 138 kV (Dane County) (Figure 3)**

Although this site had very few environmental constraints (Figure 3), it was eliminated from further consideration for the following reason:

- The existing substation is located in close proximity to dense residential populations associated with the City of Verona to the west and the City of Fitchburg to the north and east. This amount of dense residential land use often rules out development of large scale utility projects.

**WPS Rockland 138 kV (Brown County) (Figure 3)**

This site was eliminated from consideration for the following reasons:

- Floodplains to the east and west of the substation, and well as wetlands and waterways in close proximity to the substation, pose limitations to development potential and land control.
- The existing substation is located in close proximity to the City of De Pere, which would limit the acreage of contiguous tracts of land available for Project development.

**Root River 138 kV (Milwaukee County) (Figure 3)**

This site was eliminated from consideration for the following reasons:

- Land control limitations posed by the presence of floodplain throughout the potential project area (Figure 3) would have made it difficult to gain control of more than 500 acres of viable land in close proximity to the substation (a fatal flaw).
- The presence of rivers and streams, as well as waterbodies, wetlands, and woodlands in close proximity to the substation.
- The existing substation is located in close proximity to the City of Franklin, which hosts a dense residential population and would restrict development of land north of the substation.

**ATC Jefferson 138 kV (Jefferson County) (Figure 3)**

The Phase 2 evaluation of the ATC Jefferson 138 kV substation in Jefferson County identified no fatal flaws, and this site was carried forward for more detailed analysis in Phase 3 (see Section 3.2.3 below).

Specifically, this site was selected for the following reasons:

- Low density of residences and development.
- Adequate acreage suitable for development not within the nearby wetland and floodplains.
- Results of injection study indicated substation was robust enough to accommodate 149MW.
- Suitable solar resource in this region of the state.
- Proximity to major load centers.

### 3.2.3 Phase 3 – Site Selection

The final phase of the site selection process often overlaps with the tasks outlined in the previous task. In addition, landowner commitments are signed, and resource assessments, feasibility, suitability, and environmental reviews are performed in the field. These activities conducted for the ATC Jefferson 138 kV substation are discussed in detail in Sections 4.0 and 5.0 of the CPCN application (https://apps.psc.wi.gov/ERF/ERFview/viewdoc.aspx?docid=366644.

The Jefferson County location was selected following a rigorous analysis of three key factors: the existing transmission grid in Wisconsin, the suitability of available land, and the receptiveness of the community.

Ranger Power commissioned a third-party load flow analysis (i.e., injection study) to determine if there would be significant network upgrades required besides a typical substation expansion to accommodate the Project at the 138kV Jefferson substation. The load flow analysis considers the location of the point of interconnection in the Independent System Operator's footprint, proximity to load (which can help avoid constraints). Load flow simulations are performed to test the project's transmission impacts and potential triggers for required upgrades. The results of this analysis indicated that no significant upgrades would be required to accommodate a 149MW solar generating facility at this location. Badger State executed a Generator Interconnection Agreement with ATC dated April 22, 2020.

With respect to suitability of available land, solar farms are best sited on tracts that are relatively flat or have a slight southern incline. In addition, the use of cleared land, such as agricultural fields, minimizes impacts from shading and avoids the need to remove trees. It also significantly reduces the potential for Project effects to sensitive plants or wildlife species. The Jefferson County location meets these land suitability requirements. Further, the Jefferson County location was selected based on the results of environmental and engineering studies conducted during the CPCN process (see Section 4.0 and 5.0 of the CPCN application (https://apps.psc.wi.gov/ERF/ERFview/viewdoc.aspx?docid=366644).

With respect to receptiveness of the community, Ranger places great importance on community-supported projects. In order to be a good neighbor, it is important that the Project start out on the right foot by being transparent and being in constant communication with the public. The Ranger team engaged local landowners, neighboring landowners, municipal leaders, and state legislators early on in its development process (see Section 1.4). Jefferson and Oakland Townships and Jefferson County expressed positive feedback after the Project was announced. Badger State and local governments later entered into a Joint Development Agreement to address topics not covered by the state permitting process.

# 4.0 PROJECT DESCRIPTION

The Proposed Action for the Badger State Solar Project consists of the following components:

## 4.1 SOLAR PANELS

The Project area is designed for approximately 487,848 panels with a generating DC power capacity of 180 MW to 204.9 MW. The PV module selected for the Badger State Project will have approximately 72-cells and will be a plate glass module with an aluminum frame with approximate dimensions of one meter by two meters. The PV modules will be connected in series for up to 1500V operation and will be mounted on a tracker system in-line in landscape orientation on racking which tracks east to west to follow the sun throughout the day.

## 4.2 SOLAR PANEL FOUNDATIONS

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

In summary:

- Approximate height of tracker rotation shaft – 3 to 7 feet.
- Minimum tracker height (module edge to ground at maximum tilt) – 2 to 4 feet.
- Maximum tracker height (module edge to ground at maximum tilt) – 12 feet.
- Range of tracking angle - +/-60 degrees.

The variability in height is due to the panel configuration on the racking system. Some systems are designed with panels in a single portrait configuration with a single row of panels arranged in a portrait configuration relative to a viewer east or west of the row. The long axis of the panels would be perpendicular to the axis of the tracking system. The panels would be approximately four feet above grade when tilted flat at mid-day in this design. A racking system with a two-portrait design may also be selected. This system holds two panels in portrait configuration with an axis that is perpendicular to the tracker. The two-portrait configuration requires taller piles and results in a taller overall system, but also provides for wider aisles. Racking system design will be selected prior to construction.

In the case of extreme weather conditions, Badger State has reviewed the closest weather station's climate history, as verified by the Solar America Board for Codes and Standards. Potential tracking technologies will be assessed in the context of other project attributes, such as resource forecast and expected operating profile. The final selection could assume an operating scenario where equipment can operate in the most extreme heat and cold, or potentially pause tracking operation until these conditions pass.

The complete tracker system will be arranged into rows of individual trackers with an estimated length of 250 feet by seven feet (when panels are horizontal) with gaps placed between sections or groups of sections to allow for maintenance personnel to access the whole site. The piles will run north to south along the row to support each section of the steel structure and will likely include an integrated cable management solution in order to support the insulated copper DC string cabling which interconnects each of the PV modules. Approximately 63,306 foundation piles will be used for the Project.

These solar trackers are currently expected to be self-powered, however some tracker systems available require external power to be bought from an auxiliary power source.

## 4.3 ACCESS ROADS

The Project plans to utilize existing public roadways to access the site. The Project will have up to approximately 15 miles of internal roads. Construction matting may be used to a limited extent during construction in areas with soil strength limitations for construction. In these areas, the existing soil surface will remain intact, planted in perennial vegetation, and maintained for operation and maintenance once construction is completed.

If areas are identified as having soil strength limitations to support construction vehicles where vehicle traffic will be more frequent (i.e. site approaches), aggregate materials may be used. In these areas, topsoil will be moved and stored for use during reclamation. Geotextile matting will be installed prior to placement of aggregate to prevent mixing with native subsoil. The aggregate would be maintained for the life of the Project.

## 4.4 UNDERGROUND COLLECTOR CIRCUITS

The collector circuits are planned as an underground system with direct buried cables or cables installed in direct buried ducts. There will be approximately 10.5 miles of collector circuits installed by trench and approximately 0.5 miles installed by directional boring. The collector circuit voltage will be 34.5kV.

The collection system will typically be buried at a depth of 36 inches to the top of the cables. The trench for the cable will be one foot wide. Where multiple cables are installed parallel to each other, the cable separation will be two feet apart, therefore the width of the trench will vary depending on the number of circuits within the trench.

## 4.5 PROJECT COLLECTOR SUBSTATION

The Project will include a collector substation with a 138/34.5kV main transformer. A footprint of 280 feet by 195 feet has been allocated at this stage and will generally include items below within the substation:

- 34.5kV switchgear or open-air switches;
- 34.5kV bus and supporting structures;
- 34.5kV metering and instrumentation;
- Station service transformer;
- Main power transformer 34.5kV to 138kV, may also be split into two smaller transformers;
- 138kV circuit breaker;
- 138kV bus and supporting structures;
- 138kV metering and instrumentation;
- 138kV dead-end structure and outgoing transmission line to ATC substation;
- Protection and control building;
- Internal access roads;
- Security fence with vehicle gate, service gate, barbed wire. Fence to be grounded per NESC requirements;
- Buried power cables, control cables and bare copper grounding grid;
- Lightning protection masts (as required);
- Yard lighting to be used during maintenance and or during emergency; and
- Any required power factor control equipment such as a STATCOM or capacitor bank.

## 4.6 TRANSMISSION INTERCONNECTION

The Project will be interconnected to the transmission grid through an existing substation owned by ATC. The ATC station is located to the northeast of the proposed Project substation and will require a short 138kV overhead line between the two stations.

## 4.7 PROJECT LIFESPAN

The design life for the Project is approximately 30-35 years.

## 4.8 DECOMMISSIONING

At the end of the Project's useful life, the Project would cease operation. At that time, the facilities would be decommissioned and dismantled, and the site restored to its preconstruction condition or returned to farm production. Decommissioning activities will require approximately 12 months to complete. In general, decommissioning activities will include:

1. Dismantling and removal of all above ground equipment (solar panels, racking, transformers, Project Substation, etc.);
2. Excavation and removal of all above ground cabling;
3. Removal of foundations (piles, piers, and posts);
4. Underground cables will be removed based on agreed upon conditions reached with the landowner and codified in the lease; and
5. Scarification of compacted areas within and contiguous to the solar facility (including but not limited to internal and external access roadways).

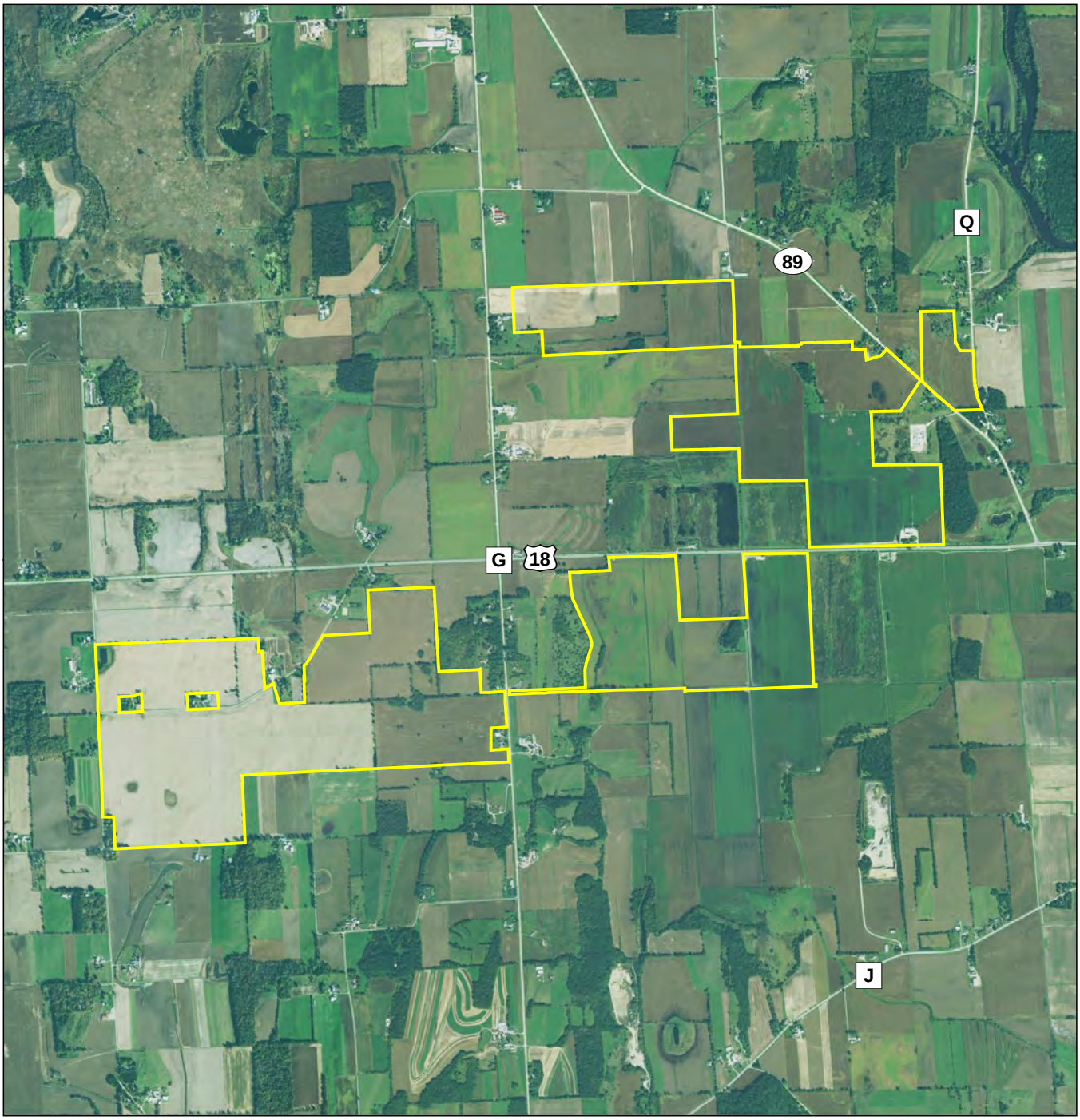
For the gen-tie line, telecommunication lines, and collector substation dismantling would proceed according to four general stages: (1) dismantling and demolishing above ground structures; (2) removal of concrete foundations; (3) excavation and removal of soils and broken concrete from the site; and (4) surface contouring to return the disturbed areas to near-original conditions.

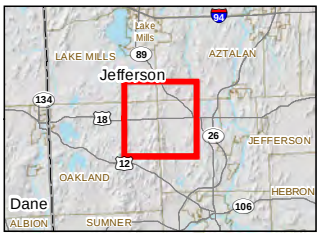
If the facility is to be returned to a condition suitable for agricultural production upon the completion of its decommissioning, the land will be tilled to break up the vegetation cover that has been established for the Project. The vegetation layer within the Project area will consist of a mixture of areas where prairie plantings and non-native vegetation covers have been maintained. The use of deeply rooted native prairie vegetation and the "resting" of soil either under this or a non-native cover has been well documented to provide benefits and improvement to soil health.

# 5.0 REFERENCES

Badger State Solar. Application for Certificate of Public Convenience and Necessity **Badger State Solar LLC Solar Project Docket #9800-CE-100** Jefferson County, WI. Accessed online at: https://apps.psc.wi.gov/ERF/ERFview/viewdoc.aspx?docid=366644 on January 26, 2021.

Stantec Consulting Services (Stantec) 2021. Badger State Solar, LLC - Alternatives Evaluation Study. January 14, 2021.




Legend

Approximate Project Area

0 1,500 3,000 Feet

(At original document size of 8.5x11)
1:36,000

N

***Notes***

**1.** Coordinate System: NAD 1983 UTM Zone 15N
**2.** Data Sources: Stantec, Ranger Power, WisDOT, WDNR
**3.** Background: NAIP 2018

Stantec

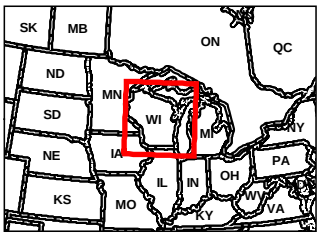
*Project Location*
T6N, R13E, S11, 12, 14
T. of Oakland, Jefferson Co., WI

Prepared by RA on 2021-01-26
TR by JP on 2021-01-26
IR by SP on 2020-01-26

*Client/Project* 193705828
Badger State Solar, LLC
Badger State Solar Project

*Figure No.*
**1**

*Title*
**Badger State Solar Site**


Legend

- Phase 1 Substation Location
- Phase 2 Substation Location

0 25 50 Miles

N

(At original document size of 8.5x11)
1:3,168,000

***Notes***

**1.** Coordinate System: NAD 1983 UTM Zone 15N
**2.** Data Sources: Stantec, Ranger Power, USGS
**3.** Background: USGS U.S. Section Map

Stantec

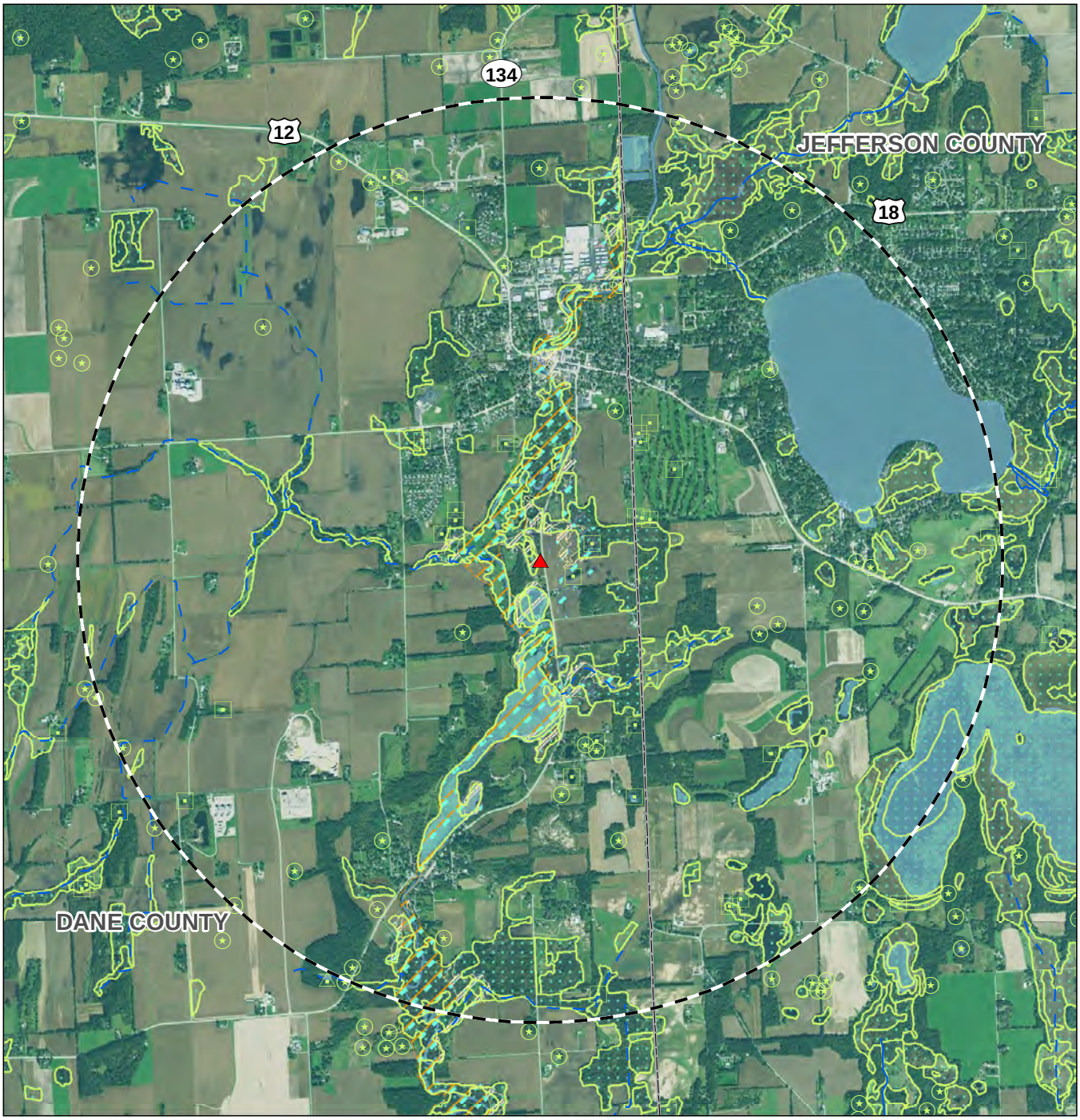
*Project Location*
T11N, R12E, S05
T. of Dane, Dane Co., WI

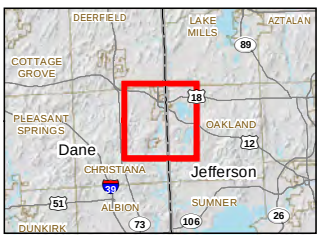
Prepared by RA on 2021-01-25
TR by JH on 2021-01-25
IR by SP on 2021-01-27

*Client/Project* 193705828
Badger State Solar, LLC
Badger State Solar Project

*Figure No.*
**2**

*Title*
**Site Selection Study Overview**




**Notes**
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, Ranger Power, WisDOT, WDNR, FEMA
3. Background: NAIP 2018

Legend

- Cambridge 138kV
- Substation 2 Mile Buffer

WWI Wetland Class Points

- Dammed Pond
- Excavated Pond
- Wetland Too Small to Delineate

WWI Wetland Class Areas

- Wetland

FEMA Flood Hazard Areas

- 100-year Flood Zone
- 100-year Floodway
- 500-year Flood Zone

DNR 24k Hydrography

- Perennial Stream
- Intermittent Stream
- Waterbody

0 1,750 3,500 Feet

(At original document size of 8.5x11)
1:42,000

N

Stantec

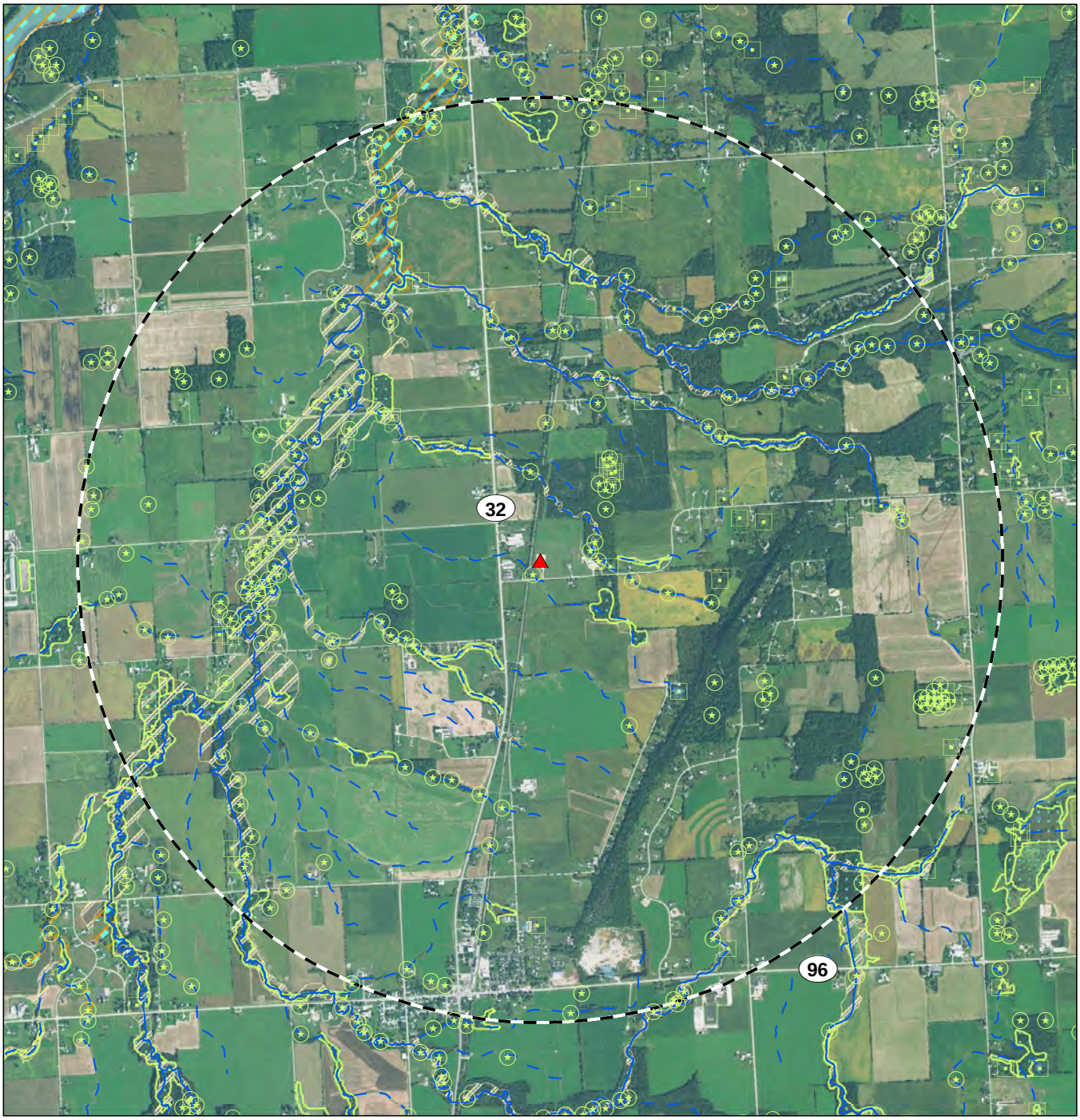
*Project Location*
T6N, R12E, S13
T. of Christiana, Dane Co., WI

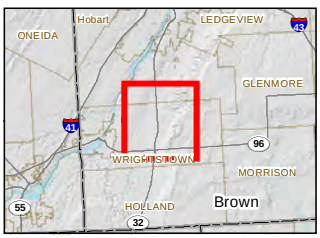
Prepared by RA on 2021-01-25
TR by JP on 2021-01-26
IR by SP on 2021-01-27

*Client/Project* 193705828
Badger State Solar, LLC
Badger State Solar Project
Cambridge 138kV

*Figure No.*
**3**

*Title*
**Environmental Constraints**
**Phase 2 Locations**




**Notes**
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, Ranger Power, WisDOT, WDNR, FEMA
3. Background: NAIP 2018

Legend

- WPS Greenleaf 138kV
- Substation 2 Mile Buffer

WWI Wetland Class Points

- Excavated Pond
- Wetland Too Small to Delineate

WWI Wetland Class Areas

- Wetland

FEMA Flood Hazard Areas

- 100-year Flood Zone
- 100-year Floodway
- 500-year Flood Zone

DNR 24k Hydrography

- Perennial Stream
- Intermittent Stream
- Waterbody

*No features within data frame

0 1,750 3,500 Feet

(At original document size of 8.5x11)
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N

Stantec

*Project Location*
T22N, R20E, S33
T. of Wrightstown, Brown Co., WI

Prepared by RA on 2021-01-25
TR by JP on 2021-01-26
IR by SP on 2021-01-27

*Client/Project* 193705828
Badger State Solar, LLC
Badger State Solar Project
WPS Greenleaf 138kV

*Figure No.*
**3**

*Title*
**Environmental Constraints**
**Phase 2 Locations**



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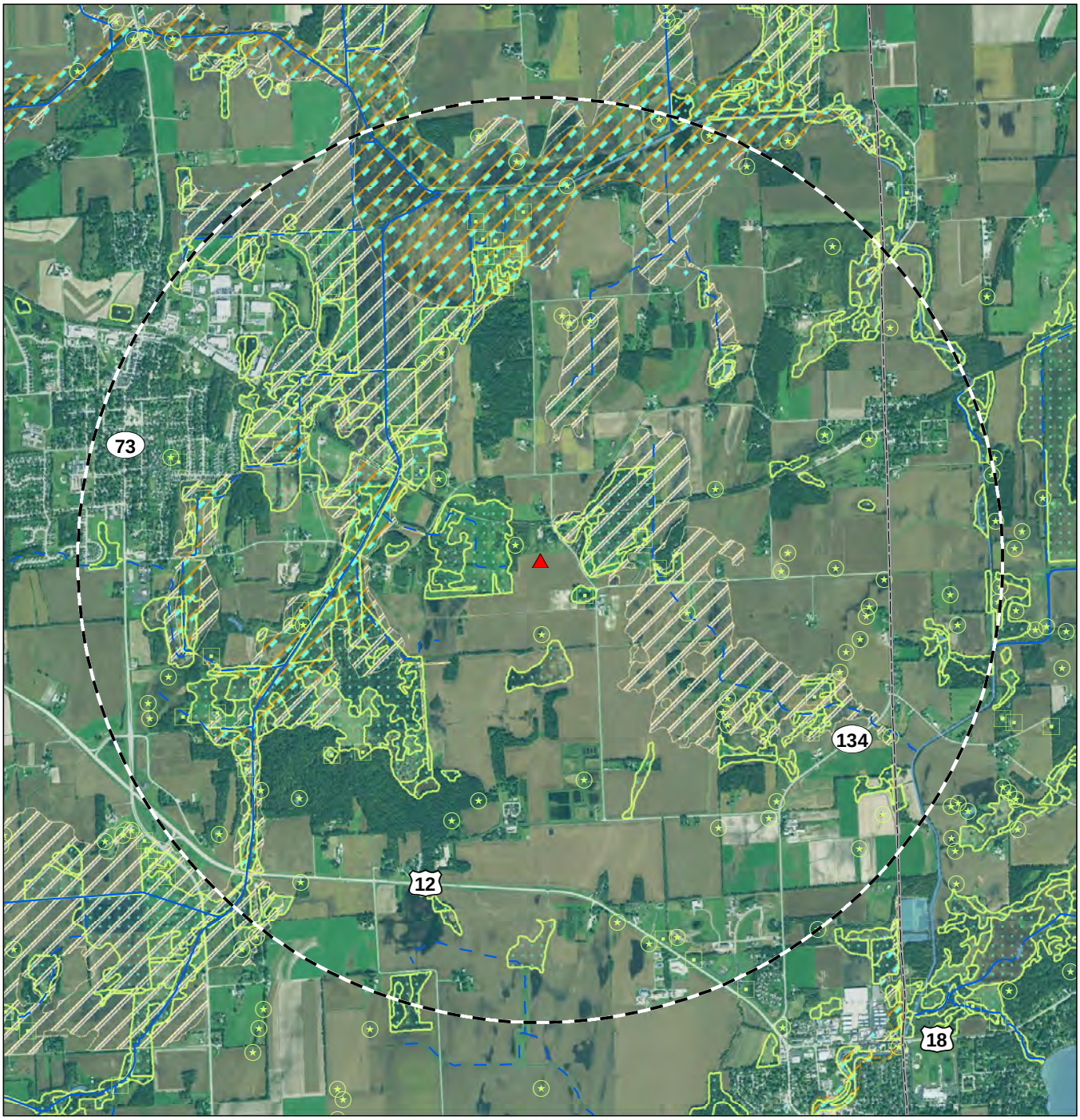


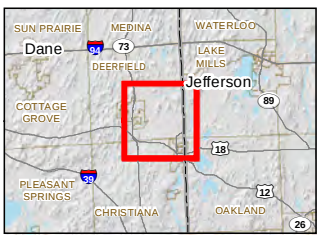


**Notes**

1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, Ranger Power, WisDOT, WDNR, FEMA
3. Background: NAIP 2018

Legend

- London 138kV
- Substation 2 Mile Buffer

WWI Wetland Class Points

- Excavated Pond
- Wetland Too Small to Delineate

WWI Wetland Class Areas

- Wetland

FEMA Flood Hazard Areas

- 100-year Flood Zone
- 100-year Floodway
- 500-year Flood Zone

DNR 24k Hydrography

- Perennial Stream
- Intermittent Stream
- Waterbody

0 1,750 3,500 Feet

(At original document size of 8.5x11)
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N

Stantec

*Project Location*
T7N, R12E, S26
T. of Deerfield, Dane Co., WI

Prepared by RA on 2021-01-25
TR by JP on 2021-01-26
IR by SP on 2021-01-27

*Client/Project* 193705828
Badger State Solar, LLC
Badger State Solar Project
London 138kV

*Figure No.*
**3**

*Title*
**Environmental Constraints**
**Phase 2 Locations**



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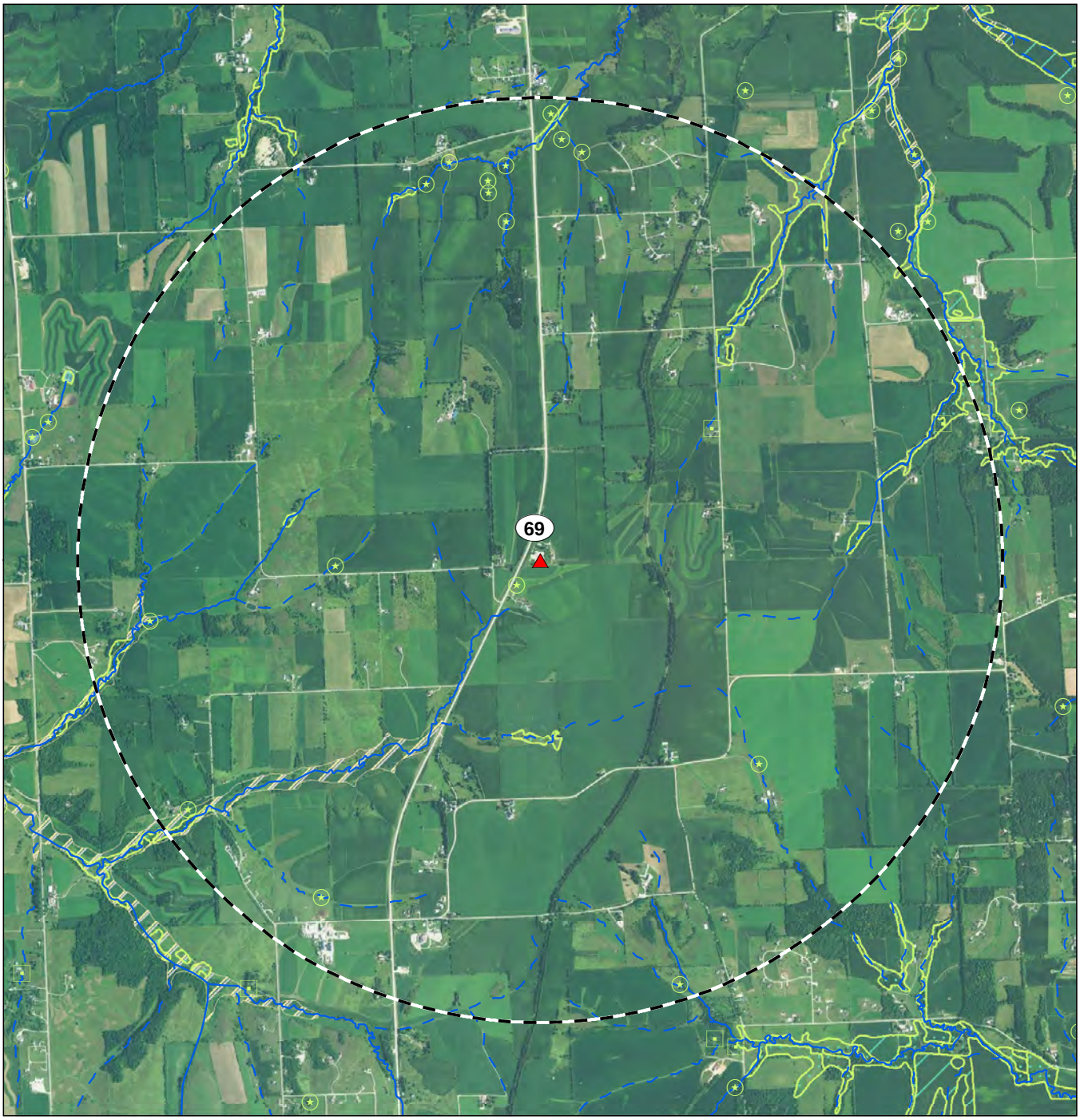


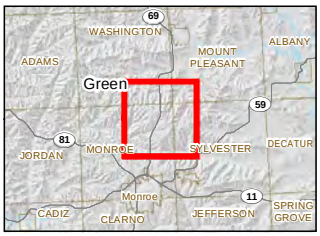


***Notes***

**1.** Coordinate System: NAD 1983 UTM Zone 15N
**2.** Data Sources: Stantec, Ranger Power, WisDOT, WDNR, FEMA
**3.** Background: NAIP 2018

Legend

- ATC North Monroe 138kV
- Substation 2 Mile Buffer

WWI Wetland Class Points

- Excavated Pond
- Wetland Too Small to Delineate

WWI Wetland Class Areas

- Wetland
- Filled Area

FEMA Flood Hazard Areas

- 100-year Flood Zone
- 100-year Floodway*
- 500-year Flood Zone*

DNR 24k Hydrography

- Perennial Stream
- Intermittent Stream
- Waterbody*

*No features within data frame

0 1,750 3,500 Feet

(At original document size of 8.5x11)
1:42,000

N

Stantec

*Project Location*
T2N, R7E, S1
T. of Monroe, Green Co., WI

Prepared by RA on 2021-01-25
TR by JP on 2021-01-26
IR by SP on 2021-01-27

*Client/Project* 193705828
Badger State Solar, LLC
Badger State Solar Project
ATC North Monroe 138kV

*Figure No.*
**3**

*Title*
**Environmental Constraints**
**Phase 2 Locations**



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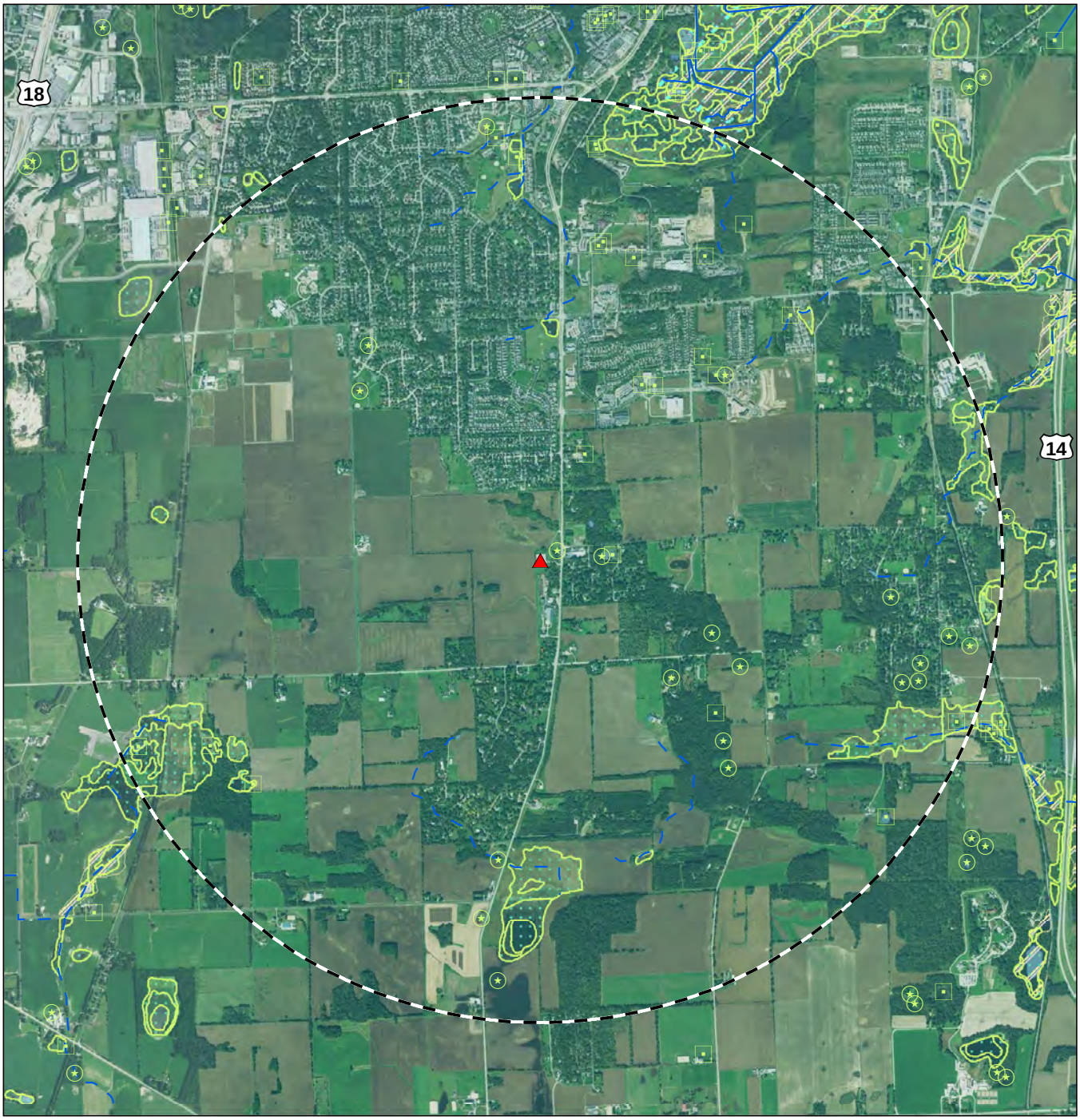
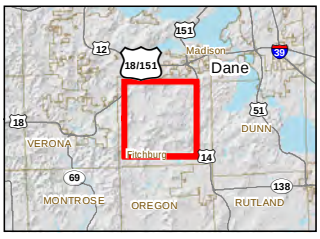



***Notes***

**1.** Coordinate System: NAD 1983 UTM Zone 15N
**2.** Data Sources: Stantec, Ranger Power, WisDOT, WDNR, FEMA
**3.** Background: NAIP 2018

Legend

- ATC Oakridge 138kV
- Substation 2 Mile Buffer

WWI Wetland Class Points

- Excavated Pond
- Wetland Too Small to Delineate

WWI Wetland Class Areas

- Wetland

FEMA Flood Hazard Areas

- 100-year Flood Zone
- 100-year Floodway*
- 500-year Flood Zone

DNR 24k Hydrography

- Perennial Stream
- Intermittent Stream
- Waterbody

*No features within data frame

0 1,750 3,500 Feet

(At original document size of 8.5x11)
1:42,000

N

Stantec

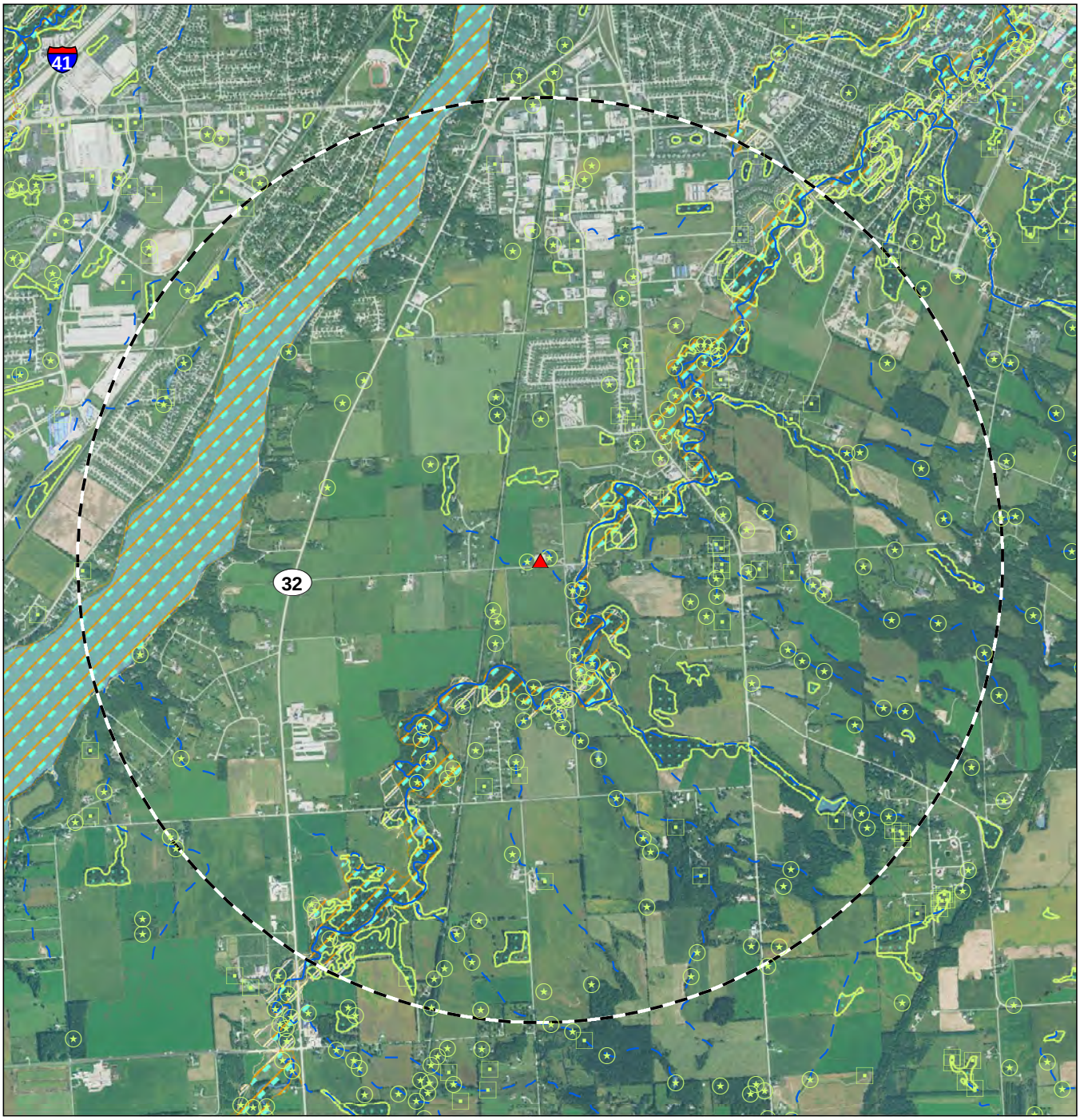
*Project Location*
T6N, R9E, S21
C. of Fitchburg, Dane Co., WI

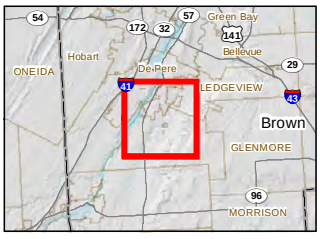
Prepared by RA on 2021-01-25
TR by JP on 2021-01-26
IR by SP on 2021-01-27

*Client/Project* 193705828
Badger State Solar, LLC
Badger State Solar Project
ATC Oakridge 138kV

*Figure No.*
**3**

*Title*
**Environmental Constraints**
**Phase 2 Locations**




***Notes***

**1.** Coordinate System: NAD 1983 UTM Zone 15N
**2.** Data Sources: Stantec, Ranger Power, WisDOT, WDNR, FEMA
**3.** Background: NAIP 2018

Legend

- WPS Rockland 138kV
- Substation 2 Mile Buffer

WWI Wetland Class Points

- Excavated Pond
- Wetland Too Small to Delineate

WWI Wetland Class Areas

- Wetland

FEMA Flood Hazard Areas

- 100-year Flood Zone
- 100-year Floodway
- 500-year Flood Zone

DNR 24k Hydrography

- Perennial Stream
- Intermittent Stream
- Waterbody

0 1,750 3,500 Feet

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N

Stantec

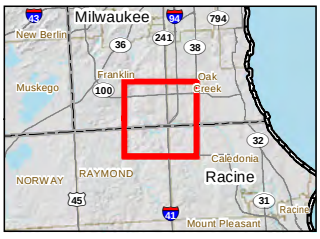
*Project Location*
T22N, R20E, S3
T. of Rockland, Brown Co., WI

Prepared by RA on 2021-01-25
TR by JP on 2021-01-26
IR by SP on 2021-01-27

*Client/Project* 193705828
Badger State Solar, LLC
Badger State Solar Project
WPS Rockland 138kV

*Figure No.*
**3**

*Title*
**Environmental Constraints**
**Phase 2 Locations**


***Notes***

**1.** Coordinate System: NAD 1983 UTM Zone 15N
**2.** Data Sources: Stantec, Ranger Power, WisDOT, WDNR, FEMA
**3.** Background: NAIP 2018

Legend

- Root River 138kV
- Substation 2 Mile Buffer

WWI Wetland Class Points

- Excavated Pond
- Filled Excavated Pond
- Filled/Drained Wetland
- Wetland Too Small to Delineate

WWI Wetland Class Areas

- Wetland
- Filled Area

FEMA Flood Hazard Areas

- 100-year Flood Zone
- 100-year Floodway
- 500-year Flood Zone

DNR 24k Hydrography

- Perennial Stream
- Intermittent Stream
- Waterbody

0 1,750 3,500 Feet

(At original document size of 8.5x11)
1:42,000

N

Stantec

*Project Location*
T5N, R21E, S36
C. of Franklin, Milwaukee Co., WI

Prepared by RA on 2021-01-25
TR by JP on 2021-01-26
IR by SP on 2021-01-27

*Client/Project* 193705828
Badger State Solar, LLC
Badger State Solar Project
Root River138kV

*Figure No.*
**3**

*Title*
**Environmental Constraints**
**Phase 2 Locations**



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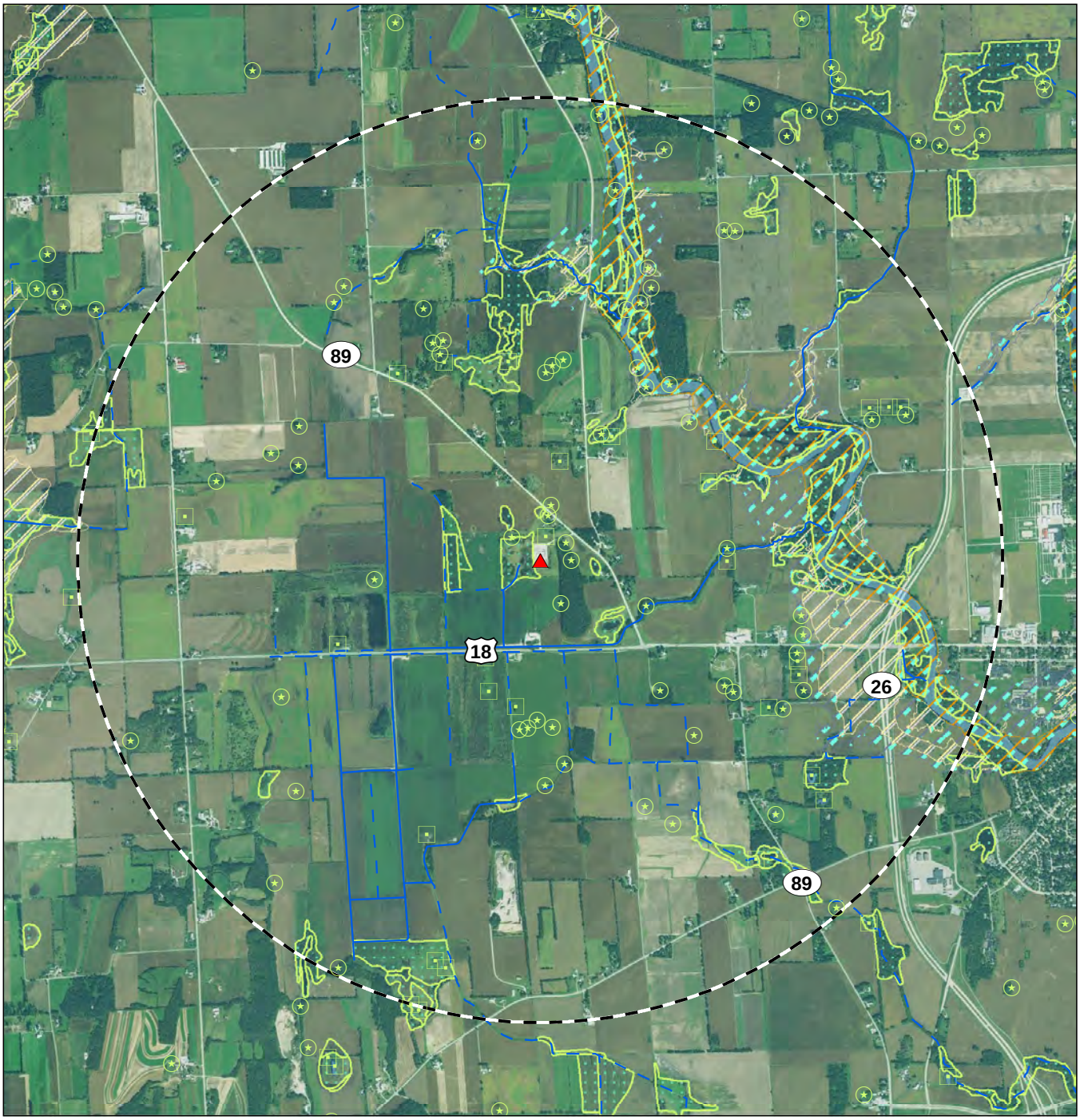


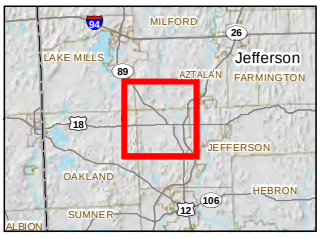


***Notes***

**1.** Coordinate System: NAD 1983 UTM Zone 15N
**2.** Data Sources: Stantec, Ranger Power, WisDOT, WDNR, FEMA
**3.** Background: NAIP 2018

Legend

- Jefferson 138kV
- Substation 2 Mile Buffer

WWI Wetland Class Points

- Dammed Pond
- Excavated Pond
- Wetland Too Small to Delineate

WWI Wetland Class Areas

- Wetland

FEMA Flood Hazard Areas

- 100-year Flood Zone
- 100-year Floodway
- 500-year Flood Zone

DNR 24k Hydrography

- Perennial Stream
- Intermittent Stream
- Waterbody

0 1,750 3,500 Feet

(At original document size of 8.5x11)
1:42,000

N

Stantec

*Project Location*
T6N, R14E, S5
T. of Jefferson, Jefferson Co., WI

Prepared by RA on 2021-01-25
TR by JP on 2021-01-26
IR by SP on 2021-01-27

*Client/Project* 193705828
Badger State Solar, LLC
Badger State Solar Project
Jefferson 138kV

*Figure No.*
**3**

*Title*
**Environmental Constraints**
**Phase 2 Locations**



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