**PROJECT TITLE: Studying Solar Panel Impact on Vegetation Quality**

**I. PROJECT STATEMENT**

Solar power production in Minnesota has seen dramatic increases in implementation. According to the Solar Energy Industries Association March 2019 report, Minnesota is ranked 13th nationally and is producing 1,093.8 megawatts. This equates to up to 11,000 acres of land used for solar installation in Minnesota. Panel installation often occurs over natural habitats like wetlands or native forbs, but little is known about how panels influence the vegetative quality after installation. Similarly, there is a lack of information about how well native seed mixes are establishing under panels. Solar panels may negatively impact vegetative quality and natural habitats, and with a projected growth of an additional 8,370 acres of solar in Minnesota over the next five years, the effects of solar on vegetative quality need to be quantified. This study will evaluate the influence of solar panels on existing and planted plant communities under solar installations of varying stages of development and will use the data to influence regulation of solar installation in Minnesota. The project is a 3.5-year study from 2020 through the end of the growing season in 2022.

In urban and suburban areas, solar sites are often placed on vacant lands that support diverse habitats of varying quality. One reoccurring question from local government units (LGUs) regarding solar development in wetlands is: Does shading and ground disturbance from solar panels alter wetland function and value, and reduce vegetative quality of a site after installation? To develop solar sites in wetland habitats, developers must work collaboratively with LGUs to adhere to state rules, specifically, the Wetland Conservation Act (WCA). WCA requires that all impacts to wetlands be avoided, minimized and replaced to achieve no net loss. Traditionally, posts and pilings from solar panels are not considered a wetland impact, but there is no supporting data to guide these LGU decisions. Shading from panels may lead to conversion of the vegetative community resulting in negative impacts to wildlife that rely on those lost communities.

After construction, many solar installations are also planted with native seed mixes under panels to develop a natural habitat that will benefit pollinators. The Board of Water and Soil Resources (BWSR) has developed a series of metrics for solar developers to achieve the status of Habitat Friendly Solar on their sites. Like the questions that arose about wetland quality under panels, there are questions about whether sites planted with native seed are achieving the necessary growth and diversity needed to support pollinators.

This project will document changes in vegetative cover, diversity and species conservatism under solar panels within both the upland and the wetland habitats at community solar sites. Field surveys will be conducted at solar sites throughout Minnesota to document changes to vegetation over time. An initial pilot study of this project was completed by WSB during the 2018 growing season on a solar site in Hugo, MN. WSB has developed data collection and analysis methodology during this pilot study. To expand this research to a regional level, WSB has partnered with Clearway Energy to evaluate an additional 16 sites throughout Minnesota. Two sites in western Wisconsin have also given WSB site access which will provide data representative of plant communities in eastern Minnesota. WSB has also met with the Board of Water and Soil Resources (BWSR) staff to discuss the project and the benefits that the data will provide to both solar developers and regulatory agencies. BWSR has agreed to advise this project as it relates to their Habitat Friendly Solar Program and wetland programs.

**II. PROJECT ACTIVITIES AND OUTCOMES**

**Activity 1:** Coordinate Site Access and Share Study Results with Project Partners.

**Description**: Coordinating site access and safety training with solar site owners and operators and updating project partners with progress, results and site outcomes.  **ENRTF BUDGET: $ 39,294**

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| **Outcome** | **Completion Date** |
| *1. Site selection and access from site owners and operators.* | *July 2020* |
| *2. Update project partners with project status, data collected, and results.* | *Annually* |

**Activity 2 Title:** Collect Data on Vegetative Quality Under Solar Panels.

**Description:**This activity includes collecting vegetation data from up to 19 solar sites throughout Minnesota. Two macroplots will be established at each solar site and one will be placed in wetland if available onsite. The macroplots will be surveyed two times per growing season to gather vegetation cover, frequency, and forb flowering data. These surveys will be conducted for 3.5 years (2020-2022) to assess changes of vegetation at different stages of solar panel installation. **ENRTF BUDGET: $ 79,895**

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| **Outcome** | **Completion Date** |
| *1. Collect early growing season vegetation data at the solar sites.* | *Annually* |
| *2. Collect late growing season vegetation data at the solar sites.* | *Annually* |

**Activity 3 Title:** Data Analysis of Vegetative Composition and Report/Recommendations of Results.

**Description:**Enter data into analysis software to produce measurable results that can be compared over consecutive years of data collection and that will assess the changes in vegetative composition and quality. **ENRTF BUDGET: $ 48,894**

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| **Outcome** | **Completion Date** |
| *1. Enter data into the Frames Feats/Firemon Integrated (FFI-Lite) interagency plot-level monitoring software application.* | *Annually* |
| *2. Analyze the data for cover/frequency, diversity, Coefficient of Conservatism, Floristic Quality Index, species richness, and other metrics.* | *Annually* |
| *3. Summarize the data in a report at the end of each year of data collection. Data will be compared year-to-year during subsequent years.* | *Annually* |
| *4. Analyze data to determine if there was a significant change to vegetative quality.* | *July 2022* |

**III. PROJECT PARTNERS AND COLLABORATORS:**

WSB will be the fiscal agent receiving funds for the project. WSB has contributed $10,000 to develop the pilot research project methodology and data analysis. The following local agencies will assist by providing monetary or in-kind assistance to the project: Shakopee Mdewakanton Sioux Community, Red Lake Band of Chippewa, Hindu Society of Minnesota, Goodhue SWCD, Renville SWCD, Sibley SWCD and Wright County SWCD. This project is also supported by Great Plains Institute, the City of Hugo, the City of Maple Grove, and Chippewa, Kandiyohi, McLeod, and Olmstead SWCDs. Clearway Energy is providing access to 16 solar sites throughout Minnesota and has provided all previous permitting, planting plans, and vegetation reports that have been produced during the development of the sites. ENGIE is providing access to two sites in western Wisconsin that will provide plant community data representative of eastern Minnesota.

**IV. LONG-TERM IMPLEMENTATION AND FUNDING:**

This proposal brings WSB’s initial pilot project to fruition at a larger scale, making it applicable to a range of stakeholders so that the data can be used at a local, state and regional level to guide collaboration and facilitate continued growth in alternative energy sources while improving ecological outcomes. The data will be a basis for regulator decisions, specifically, in protecting existing high-quality wetland or upland vegetative communities. It will also provide the knowledge base for understanding how particular sites may or may not provide suitable habitat for pollinator species based on planned site preparation, seeding, and maintenance activities.

**V. SEE ADDITIONAL PROPOSAL COMPONENTS:**

**A.** Proposal Budget Spreadsheet; **B.** Visual Component or Map**; C.** Parcel List Spreadsheet; **D.** Acquisition, Easements, and Restoration Requirements**; E.** Research Addendum (Not required at proposal submission stage. Required later in process, if proposal is recommended. Staff will provide further information at that time); **F.** Project Manager Qualifications and Organization Description; **G.** Letter or Resolution; **H.** Financial Capacity