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February 28, 2022

Project/File: 193707481

William Skalitzky
Wisconsin Power and Light Co.
4902 N. Biltmore Lane
Madison, WI 53718

Dear William Skalitzky,

Reference: Beaver Dam Solar Project - Water Quality Improvements

Wisconsin Power and Light Company (WPL) is proposing to construct the Beaver Dam Solar Project (Project), a solar electric generation facility, in Dodge County, Wisconsin. The proposed Project is to be located in the City of Beaver Dam, Beaver Dam Township, and Burnett Township, Wisconsin **(Figure 1)** within approximately 572 acres of predominantly agricultural land. The Beaver Dam project will convert 394 acres of agricultural land to a mixture of native and non-native grassland habitat. The conversion of this land will decrease the amount of nitrogen, phosphorus, sediment, and biological oxygen demand (BOD) entering surrounding waterways. High loadings of these pollutants produce excess algae growth, decrease dissolved oxygen levels, and degrade the habitat in adjacent waterbodies. This affects not only the organisms that inhabit these waters, but the people who live and recreate there, impacting fishing and boating, decreasing tourism, and lowering property values.

To estimate the pollutant reductions that will result from this land conversion, two water quality models were conducted using publicly available watershed data. The Environmental Protection Agency's STEPL model (Spreadsheet for Estimating Pollutant Loads) was used to quantify the pollutant loads originating from the land in its agricultural condition and in its proposed prairie condition. The United States Geological Survey's SPARROW model (Spatially Referenced Regression on Watershed Attributes) model was used to determine the percentage of these pollutants that will enter local waterbodies.

Project Area

The project spans two subwatersheds. A subwatershed is an area of land from which all water, sediments, and dissolved materials that drain from that land flow to a particular receiving waterbody or to a common point along a receiving waterbody. The project will convert 292 acres of land in the West Branch Rock River-Horicon Marsh Subwatershed and 102 acres in the Shaw Brook Subwatershed to prairie land, as seen in **Figure 1**.

Methods

To quantify the pollutant load reductions resulting from the conversion of agricultural land to prairie land, the STEPL model was conducted. STEPL calculates the annual nutrient loading based on the runoff volume and the pollutant concentrations in the runoff water, as influenced by factors such as the land use distribution and best management practices (BMPs). STEPL also calculates the annual sediment load based on the Universal Soil Loss Equation (USLE) and the sediment delivery ratio. The sediment and

pollutant load reductions that result from the implementation of BMPs are computed using the known BMP efficiencies.

General watershed characteristics, such as land use data, local weather data, numbers of agricultural animals, septic system data, and soils groups were obtained from the EPA's Input Data Server and used in the model. County average Bray phosphorus concentrations were obtained from the Department of Agriculture, Trade, and Consumer Protection (DATCP) and used in the model. County average nitrogen, sediment, and BOD concentrations were used as defaults provided by the model. Data on irrigation of the land was omitted, which may lead to an underestimate of nutrient losses if the land was previously irrigated.

The acreage of converted land in each subwatershed was entered as a "Land Retirement" BMP within the "Cropland" area of the watershed. "Land Retirement" was the BMP that closest captured the conversion, although it may underestimate the additional benefits of planting pollinator-friendly grass types.

To determine the impact of the pollutant load reductions on local waterbodies, the Department of Natural Resource's Surface Water Data Viewer was used to determine the hydrology of the area as well as assessments and impairments of local waterbodies. The SPARROW model was run using the SPARROW catchments within the viewer. The SPARROW model uses a regression equation to estimate the amount of pollutant loadings that travel from one catchment to another. Each catchment is assigned a fraction based on their contribution to the loading of the ultimate target, and the difference between the fractions can estimate how much pollutants are traveling between lands. The following equation was used to determine the percentage load reductions to surrounding waterbodies, with the target fraction being the fraction associated with the waterbody's catchment and the project fraction being the fraction associated with the project.

$$Delivery\ Fraction = 1 - \frac{target\ fraction - project\ fraction}{target\ fraction}$$

This was then converted to a percentage to get the impact of pollutant load reductions on each waterbody. The percentage load reductions from SPARROW were then applied to the STEPL results to determine the pollutant load reductions that will benefit each waterbody.

Results

Overall Project

According to the EPA's Spreadsheet for Estimating Pollutant Loads (STEPL) model, the project in total will:

- Reduce annual loadings of nitrogen by 4,142 pounds per year
- Reduce annual loadings of phosphorus by 1,165 pounds per year
- Reduce annual loadings of sediment by 200 tons per year
- Reduce annual loadings of BOD by 1,278 pounds per year

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This amounts to:

- 10.5 pounds of nitrogen per acre, per year
- 3.0 pounds of phosphorus per acre, per year
- 0.5 tons of sediment per acre, per year
- 3.2 pounds of BOD per acre, per year

These numbers reflect only the loadings that result from the land conversion itself, and do not reflect additional loadings of fertilizer, manure, and pesticides applied on the farmland. According to the US Department of Agriculture's Economic Research Service, an average of 113 pounds of nitrogen and 37 pounds of phosphorus fertilizer are applied per acre of fertilized farmland every year in Wisconsin.[1] For this project, that would amount to a fertilizer application of 44,522 pounds of nitrogen and 14,578 pounds of phosphorus fertilizer per year that could end up in local waterbodies.

Herbicides, insecticides, and fungicides are also applied to the majority of acres under corn production in Wisconsin and their presence in waterways causes a multitude of risks to human and ecological health[2]

Therefore, it is likely that the proposed project would provide more environmental benefits than are expressed in these models.

West Branch Rock River-Horicon Marsh Subwatershed

Every year, the West Branch Rock River-Horicon Marsh Subwatershed will receive:

- 3,049 fewer pounds of nitrogen
- 851 fewer pounds of phosphorus
- 142 fewer tons of sediment
- 909 fewer pounds of BOD

Mill Creek

According to the USGS SPARROW model,

Ninety-four percent (94%) of these pollutant reductions will benefit Mill Creek, which is impaired due to high phosphorus levels.

Every year, Mill Creek will receive:

- 2,858 fewer pounds of nitrogen
- 798 fewer pounds of phosphorus

[1] United States, Congress, Economic Research Service. *Fertilizer Use and Price*, 2019.

[2] United States, Congress, National Agricultural Statistics Service. 2018 Agricultural Chemical Use Survey, No. 2019-1 ed., 2019. NASS Highlights.

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- 133 fewer tons of sediment
- 852 fewer pounds of BOD

Horicon Marsh Area and Rock River

Eighty-two percent (82%) of these pollutant reductions will benefit Horicon marsh area and the Rock River, which is impaired for degraded habitat, phosphorus and sediment.

These are designated as “Legacy Places,” having the highest level of conservation significance, by the Department of Natural Resources. Horicon Marsh was given this designation due to its importance as habitat for breeding and migratory birds and the Rock River for its potential to combine natural resource protection, high recreational value, and farmland protection.

Every year, the Horicon Marsh Area and Rock River will receive:

- 2,500 fewer pounds of nitrogen
- 698 fewer pounds of phosphorus
- 117 fewer tons of sediment
- 745 fewer pounds of BOD

Sinnissippi Lake

Seventy percent (70%) of these pollutant reductions will benefit Sinnissippi Lake, which is impaired for degraded habitat, excess algal growth, and eutrophication due to high phosphorus and sediment concentrations.

Every year, Sinnissippi Lake will receive:

- 2,134 fewer pounds of nitrogen
- 596 fewer pounds of phosphorus
- 99 fewer tons of sediment
- 637 fewer pounds of BOD

Shaw Brook Subwatershed

Every year, the Shaw Brook watershed will receive:

- 1,093 fewer pounds of nitrogen
- 315 fewer pounds of phosphorus
- 58 fewer tons of sediment
- 369 fewer pounds of BOD

Schultz Creek

According to the USGS SPARROW model,

Ninety-four percent (94%) of these pollutant reductions will impact Schultz Creek, which is impaired for total suspended solids.

Every year, Schultz Creek will receive:

- 1,028 fewer pounds of nitrogen
- 295 fewer pounds of phosphorus
- 54 fewer tons of sediment
- 347 fewer pounds of BOD

Beaver Dam River

Sixty-six percent (66%) of these pollutant reductions will impact the Beaver Dam River, which is impaired for total phosphorus and total suspended solids. It has degraded habitat and biological community as well as low dissolved oxygen.

Every year, the Beaver Dam River will receive:

- 721 fewer pounds of nitrogen
- 207 fewer pounds of phosphorus
- 38 fewer tons of sediment
- 244 fewer pounds of BOD

Conclusions

Wisconsin Power and Light Company's Beaver Dam Project will result in the conversion of 394 acres of agricultural land into prairie grassland. This conversion will improve the water quality of surrounding waterbodies by reducing loadings of nitrogen, phosphorus, sediment, BOD, and pesticides to these waterbodies. This will improve the ecological health of the watershed and improve the quality of life for all its inhabitants.

NON-GOVERNMENTAL ORGANIZATIONS

Non-governmental organizations with a vested interest in these waters include:

Rock River Coalition
President
Eric Compas
262-472-5126
Email: compase@uww.edu

Friends of the Horicon Marsh
Executive Director
Leslie Covell-Hershberger
leslieh@horiconmarsh.org

Sinissippi Lake Improvement District
Chairman
Christine Lilek (2022)
N4914 Butternut Trail
Juneau, WI 53039

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Trout Unlimited- Aldo Leopold Chapter
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Respectfully yours,

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Attachment: Figure 1 Water Quality Trading Extent