Two Creeks Solar, LLC

Solar CPCN Application

Manitowoc and Kewaunee Counties, Wisconsin PSC Docket No. 9696-CE-100

May 31, 2018

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1. Project Description and Overview

1.1. General Project Location and Description of Project and Project Area

Two Creeks Solar, LLC (Two Creeks) is an independent power producer (IPP) proposing a 150 megawatts (MW) alternating current (AC) photovoltaic (PV) solar generating facility (the Project).[1] The Project will be located on approximately 1,300 acres of disturbed agricultural land in Manitowoc and Kewaunee counties, Wisconsin. The major components of the Project will include the PV panels, power conversion units (PCU), inverters, collection lines, a collector substation, and an operation and maintenance (O&M) building.

The Project will use PV solar modules connected to a single-axis tracking system. The planned solar modules are thin film or mono-crystalline technology and will total 210 MW direct current (DC) for the entire site. The tracking system will follow the sun from east to west throughout the day. The tracking system will be attached to steel piles driven approximately 10 feet into the ground.

The Project is located in the Town of Two Creeks and the City of Two Rivers, in both Manitowoc and Kewaunee Counties Wisconsin. The first section of the solar PV array will be built southeast of the intersection of Nuclear Road and State Highway 42. The solar PV array will interconnect to a new 138 kilovolt (kV) project collector substation north of the primary array using approximately 4 miles of underground 34.5 kV collection lines.

The Project is also capable of including a Battery Energy Storage System (BESS) at a later date if a definitive decision is made whether to include a BESS. If a BESS is included, it will be within the Project boundary depicted on the map. See **Appendix A – Project Maps**.

Two Creeks has used the Public Service Commission of Wisconsin's (PSCW or Commission) "Application Filing Requirements for Wind Energy Projects in Wisconsin" as the basis for the structure and content of this Certificate of Public Convenience and Necessity (CPCN) application (the Application). Two Creeks has modified its filing, where appropriate, to account for the fact that this is a solar PV project.

[1] Two Creeks is a wholly-owned indirect subsidiary of NextEra Energy Resources, LLC (NEER). NEER, through its affiliated entities, is the world's largest generator of renewable energy from the wind and sun. Affiliates of NEER also have a substantial and long-standing presence in Wisconsin as the owner and operator of the Point Beach Nuclear Plant, Units 1 and 2, in Two Rivers, Wisconsin.

1.1.1 Provide the following information about the project:

1.1.1.1 Project Location – counties and townships in the project area.

Table 1.1.1.1: Counties and townships in the project area

County	Primary Project Area		Alternative Project Area	
	Township/City	Sections	Township	Sections
Manitowoc	**Town of Two Creeks**	025, 026, 035, 036, 006, 005, 014, 015	**Town of Two Creeks**	006, 005, 035, 026

1.1.1.2 Size of project area in acres.

The primary Project area comprises approximately 780 acres, while the alternative Project area comprises approximately 191 additional acres.

1.1.1.3 Size (rated capacity), in MWs, of the proposed project.

The Project is 150 MW AC and 210 MW DC. Two PV modules currently being considered for the Project are First Solar Series Six thin film modules and Jinko Eagle HC mono crystalline modules.

1.1.1.4 Number of panel sites proposed for the project and the number of alternate panel sites that have been identified

The proposed Project includes six panel array areas that are separately fenced. There are six additional panel array areas that are available as alternate Project areas, if selected.

1.1.2 General maps showing the location of the project area, nearest communities, townships, and major roads

See **Appendix A – Project Maps**.

1.2.Ownership

Two Creeks intends to develop, construct, and operate the Project. It is anticipated that the ownership of the Project will be transferred to Wisconsin Public Service Corporation and Madison Gas and Electric Company prior to construction. Two Creeks is currently negotiating the transfer of ownership agreements.

1.3. Project Need/Purpose

Subsections 1.3.1 through 1.3.5 apply to utilities only, and, thus, are not applicable to Two Creeks, which is an IPP.

1.3.6 Energy Agreements

1.3.6.1 Identify all Wisconsin utilities under contract for delivery of energy from the proposed project.

An energy agreement, such as a power purchase agreement, is not currently contemplated for delivery of energy from the Project, because it is contemplated that Wisconsin utilities will own the Project. Annual energy to be delivered from the Project is detailed in Section 2.1 of the Application.

1.4. Alternatives

1.4.1 Not Applicable to Two Creeks Solar – applies to utilities only.

1.4.2 Project Area Selection

1.4.2.1 Alternative Project Areas. Describe the project area screening and selection process used to select the proposed project area.

As depicted in the map labeled **Appendix A 4.1.2 – Detailed Map**, areas 2, 12, 11, 8, and 9 were selected to provide a 25% alternative area for the Project array. As explained in Section 1.4.2.1.1, the preferred Project area and alternative Project areas were selected based on the same criteria: transmission and injection capacity, proximity to existing land and infrastructure, constructability (such as topography, environmental factors), site suitability, cultural and historical resources, construction and O&M efficiencies, and customer and landowner feedback on the placement of the arrays. The primary difference between the preferred and alternative Project areas is that the preferred Project area utilizes larger contiguous parcels that allow for more efficient utilization of the PV panels, and, therefore, maximizes the energy and capacity production of the Project. Thus, the preferred Project area is better suited for development, construction, and operation of the Project when compared to the alternative Project areas.

1.4.2.1.1 List individual factors or site characteristics used in project area selection.

The following individual factors and site characteristics were applied to the selection process of the preferred and alternative Project areas:

- Transmission and Injection Capacity
    - One of the main criteria for selecting the most suitable Project area for solar PV development is existing transmission and injection capacity. Using internal expertise, Two Creeks evaluated all existing transmission resources within a 5-mile radius and ranked each Point of

Interconnection based on voltage and existing injection capacity for the nameplate megawatt rating of the facility. The 5-mile radius was selected in an effort to minimize the need to build a generation tie line greater than 5 miles in an effort to maintain economies of scale. The area was also selected based on the knowledge of the Kewaunee Power Station nuclear plant (Kewaunee) having been decommissioned in 2013. It was believed there would be a sufficient amount of existing transmission capacity due to the retirement of Kewaunee, and by utilizing existing infrastructure within the Kewaunee switchyard, it would minimize the need to build additional interconnection facilities.

- Proximity to existing land and infrastructure

    - An affiliate of Two Creeks owns and operates the nearby Point Beach Nuclear plant (Point Beach) and a sizeable portion of property surrounding Point Beach. This was also an important factor in the site selection process. Two Creeks considered the ability to utilize existing land and nearby personnel a cost-saving factor in the development of the facility.

- Constructability – Topography

    - Another factor considered in site screening was constructability. Geotechnical studies and topographical surveys were conducted during the due diligence phase and no fatal flaws were identified by project consultants. It was also determined that minimal grading is expected to be required for the installation of the site. This is an important factor as it relates to the amount of construction and installation costs.

- Environmental Factors – Site Suitability

    - A site suitability tool was run to screen for environmental factors including, but not limited to, wetlands, waterways, trees, critical habitat, endangered species and animals, and hydric soils. The Project areas selected showed few environmental factors, and, those factors identified can be avoided by placement of the solar PV array.

- Cultural and Historic Resources – Site Suitability

    - Archaeological, cultural, and historical resources were considered during the site selection and Project design. The areas selected will not impact known archaeological, cultural, or historical resources.

- Development, Construction, and O&M Efficiencies

    - An affiliate of Two Creeks is developing a utility scale solar PV site adjacent (Point Beach Solar) to the Project, and, therefore, there are efficiencies and synergies in the development, construction, and O&M of the Project and Point Beach Solar. These two projects have different MISO Interconnection Applications and Points of Interconnection. The Two Creeks MISO Queue Number is J886 and the MISO Queue Number for the project adjacent to Two Creeks is J505. The Point of Interconnection for J505 was not utilized for the Two Creeks Project so as not to trigger additional interconnection facilities upgrades and because the two projects have different commercial operations dates.

- Customer and Landowner Feedback

    - A final consideration that went into the siting criteria for the Project was community and customer feedback. The Town of Two Creeks and Manitowoc County expressed very positive feedback after the Point Beach Solar project was announced, and welcomed additional development in their communities. Also, a key consideration for the land selected for the Project was willing landowner participation.

1.4.2.1.2 Provide a list of all project areas reviewed with weighted scores for each siting factor or characteristic used in the analysis.

The individual siting factors and characteristics referenced above were used for the selection of the alternative Project areas. However, from a constructability and environmental factor standpoint, the preferred Project area is more suitable. The alternative site areas are not as efficient from a constructability standpoint because they would require more 34.5 kV underground collection, and potentially more road crossings, resulting in an increase of construction costs and a less efficient layout from a generation perspective. The alternative Project areas potentially result in more impacts to existing wetlands and environmental factors that can be avoided by selecting the preferred Project area.

1.4.2.2 Provide a narrative describing why the proposed project area was chosen.

The Project area selected was based on proximity to multiple options of existing transmission and its proximity to the Point Beach Solar site. There are development, construction, and operating synergies afforded to the Two Creeks Project because it is nearly adjacent to Point Beach Solar. The physical site characteristics of the Project also factored into site selection; for example, there is minimal grading required to install solar

PV panels, which minimize land impacts. Additionally, the Project area avoids impacts to sensitive environmental features, and minimizes impacts to wetlands and waterways.

1.5. Site Selection

1.5.1 List the individual factors or characteristics used to select the proposed and alternate panel sites.

See Section 1.4.2 above for the individual factors or characteristics used to select the preferred Project area and the alternate Project areas.

1.5.2 Provide information on how panel site characteristics and the type/s of panels chosen factored into the selection of the final panel sites.

As explained, the siting characteristics mentioned above in Section 1.4.2 were applied to select the Project area. Two Creeks used an internal optimization tool to determine an optimal site layout and configuration that optimizes generation using the land available after topographical and environmental factors are applied to the available land. Two Creek's optimization tool determined the optimal layout presented in this Application given the space available, the topographical and environmental factors Two Creeks would like to avoid, and the size and efficiency of the modules. For example, after the Project area was chosen, specific panel locations were selected to avoid environmental and cultural resources that were within the proposed site to minimize impacts to wetlands, waterways, forested, and cultural sites. This site characterization consideration is equally applicable to the solar panels identified in Section 1.1.1.3.

1.5.3 Setback distances

Two Creeks has voluntarily established the following setback distances for the Project

Table 1.5.3: Minimum Setback Distances

Structure	Distance (feet)
Participating Residences	Minimum 40 foot setback
Non-participating Residences	Closest non-participating residence is 78 feet from the fence line and 98 feet from edge of solar array
Participating Property Lines	Minimum of 40 foot setback
Non-Participating Property Lines	Minimum of 40 foot setback
Public Road ROW	Minimum 40 foot setback
Overhead Utility Service Lines	Minimum of 40 foot setback

1.5.3.1 Identify any sites where setback waivers are needed or have been executed.

No setback waivers are needed.

1.5.3.2 Status of easement agreements:

1.5.3.2.1 Identify all easement agreement that have been signed.

Please see attached map **Appendix A 1.5.3.2 – Land Status Agreements Map** regarding easements that have been signed and those that are pending agreements. Two Creeks anticipates having all of the easement agreements executed for the Project by the end of June 2018.

1.6. Not Applicable to Two Creeks Solar – Applies to utilities only (*Utility Cost*)

1.7. MISO and Project Life Span

1.7.1 MISO Market. Describe how, at the time of this filing, the proposed facility will be treated as an intermittent resource in the MISO market.

At the time of filing of this Application, Two Creeks had already filed an Interconnection Request requesting Network Resource Interconnection Service for the full 150 MW nameplate capacity of the facility. The queue position for the Project is J886 and Two Creeks intends for the Project to be designated as a full network intermittent resource in the Midcontinent Independent System Operator (MISO) market once it executes a final Large Generator Interconnection Agreement (LGIA). J886 is currently in the August 2017 MISO Definitive Planning Phase (DPP) cycle and Two Creeks expects to execute a full LGIA no later than August 2019 based on MISO current DPP study calendar.

1.7.2 Provide an estimate of the expected life span for the power plant.

The expected lifespan for the Project is 30 years based on facility design. Two Creeks believes the facility is capable of operating beyond 30 years based on the term of the lease agreements that have been executed (initial 30-year term with two 10-year extensions), the ability for the MISO LGIA to be automatically extended annually beyond the 30 year term, and the likely operational characteristics of the modules and inverters.

1.7.3 Describe how the facility will be decommissioned at the end of its life span.

The Project will operate for a 30-year term; however, the useful life of the Project may extend an additional 10-to-20-year period. At the end of the Project's useful life, Two Creeks will assess whether to cease operations and decommission the project or to replace equipment and attempt to extend the life of the Project. In general, the majority

of decommissioned equipment and materials will be recycled. Materials that cannot be recycled with be disposed of at approved facilities.

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 pre-construction condition. Decommissioning activities will require a workforce of approximately 6 workers, and would take approximately 8 months to complete. In general, decommissioning activities would include:

1. Dismantling and removal of all above ground equipment (solar panels, racking, transformers, Project Substation, O&M building, etc.);
2. Excavation and removal of all above ground cabling;
3. Removal of posts;
4. Break-up and removal of concrete pads and foundations;
5. Pumping and break-up of any septic tank (backfilled with clean soil) and abandonment of leach field (if applicable);
6. Abandonment of underground utilities; and
7. Scarification of compacted areas within and contiguous to the solar plant 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.

1.8. Required Permits and Approvals

1.8.1 Approvals and Permits.

Table 1.8.1 summarizes the permits and approvals that are required by federal, state, and local agencies for the Project. All required permits and approvals will be obtained prior to commencing construction activities.

Table 1.8.1: List of Potential Permits and Approvals

Regulatory Authority	Permit/Approval	Application Filing Date	Status of Application	Agency Contact (name and telephone)
FEDERAL				
U.S. Army Corps of Engineers (USACE)	• Section 404 of the Clean Water Act	Expecting June 2018	Not yet Submitted	Nick Domer (651) 290-5855

Regulatory Authority	Permit/Approval	Application Filing Date	Status of Application	Agency Contact (name and telephone)
U.S. Fish and Wildlife Service (USFWS)	• Coordination on Endangered Species Act, Bald and Golden Eagle Protection Act, and Migratory Bird Treaty Act	IPaC completed 02/14/2018 Coordination Letter sent 03/05/2018	USFWS concurrence on no effect determination on 4/24/2018	Peter Fasbender (952) 252-0092
STATE				
Public Service Commission of Wisconsin (PSCW)	• CPCN for construction of large energy generation facility	May 2018	Pending	Jim Lepinski (608) 266-0478
Wisconsin Department of Transportation (WDOT)	• DT1504 State Truck Highway Connection permit for Driveway Permits	Expecting January 2019	Not yet submitted	Bob Fasick (920) 492-0148
Wisconsin Department of Natural Resources (WDNR)	• Water Resources Application for Project Permits	May 2018	Pending	Lindsay Tekler (608) 535-2602
Wisconsin Department of Natural Resources (WDNR)	• Utility Structure, Bridge, Wetland General Permit Application	May 2018	Pending	Lindsay Tekler (608) 535-2602
Wisconsin Department of Natural Resources (WDNR)	• Wisconsin Pollutant Discharge Elimination System (WPDES) Construction Site Stormwater Runoff General Permit	May 2018	Pending	Kim Gonzalez (608) 267-2759
Wisconsin Department of Natural Resources (WDNR)	• Pit/Trench Dewatering General Permit	TBD	Not yet submitted	Nile A. Ostenso (608) 266-9239
Wisconsin Department of Natural Resources (WDNR)	• Endangered Resources Review	03/06/2018	03/08/2018	Stacy Rowe (608) 266-7012
Wisconsin State Historical Society (WHS)	• Cultural Review	05/14/2018	In review	Chip Brown (608) 264-6508

Regulatory Authority	Permit/Approval	Application Filing Date	Status of Application	Agency Contact (name and telephone)
Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP)	• Agricultural Impacts Statement	Not Required (confirmed with DATCP 03/26/2018)	N/A	Marilyn Weiss (608) 224-4650
LOCAL				
Manitowoc County Planning and Zoning Department	• Shorelands Permit	None	Not required since Project is not within 1,000' of high water mark of Lake Michigan	Reed Gaedtke (920) 683-4185

1.8.2 **Correspondence with Permitting Agencies.**

Appendices L-Q contain various copies of official correspondence between Two Creeks and applicable governmental agencies concerning the Project. Two Creeks will continue to provide the Commission with copies of applicable agency correspondence following the submittal of this Application.

2. Technical Description – Project Area, Panels, Panel Sites, and Ancillary Facilities

2.1. Estimated Solar Resource and Projected Energy Production

To evaluate the solar resource for the Project, data from Clean Power Research Solar Anywhere (CPR) and on-site meteorological data was used to characterize the Global Horizontal Irradiance (GHI). The qualitative analysis included 20 years of satellite data from Clean Power Research and 22 months of good quality on-site measurements.

The CPR data shows a 20-year unadjusted annual mean estimate of 3.8 kWh/m²/day, however on-site adjustment to the CPR satellite data gives an adjusted annual mean estimate of 3.7 kWh/m²/day for the 150 MW interconnect AC (163.3 MW installed AC), 210 MW DC, tracking layout, corresponding to a range of NCF of 21% to 25% and a range of annual energy production of 275,940 MWh to 328,500 MWh depending on the final layout configuration and technology selected for the project.

The estimates of surface irradiation are generated from satellite observations of infrared & visible brightness and data from National Oceanic and Atmospheric Administration – National Centers for Environmental Prediction (NOAA-NCEP) atmospheric models, i.e. air temperature, water vapor, atmospheric optical depth, and snow depth. Ground measurements are used for validation purposes, but are not required as input data. This makes it possible to form estimates at all the "pixels" in the satellite imagery. CPR offers two sizes of pixels; lower resolution 10 km X 10 km and higher resolution 1 km X 1km. The higher resolution pixel was used in the analysis.

2.2. Panel Type and Panel Characteristics

2.2.1 Identify the manufacturer and model of solar panel to be used.

There are two solar modules currently being considered for the Project:

1. First Solar Series 6 – these thin film modules are the largest panels measuring 2.05 meters x 1.23 meters and generate approximately 440 watts each.
2. Jinko Eagle HC – mono crystalline modules measure approximately 1.99 meters x 0.99 meters and generate approximately 400 watts each.

2.2.2 Panel Delivery Date – Indicate whether or not this date is firm.

Panel deliveries are expected to occur between April and November of 2020.

2.2.3 Total number of panels required for project.

The number of panels will depend on the final selection of panels used on the project. For First Solar Series 6, there would be approximately 477,000 panels installed. For Jinko, there would be approximately 525,000.

2.2.4 Technical Characteristics of Panels.

2.2.4.1 Panel Physical Dimensions

1. First Solar Series 6 – 2.05 meters x 1.23 meters
2. Jinko Eagle HC – 1.99 meters x 0.99 meters

2.2.5 Technical Characteristics of Panel Supports

2.2.5.1 Type of material used

The racking and tracker supports are made of galvanized and stainless steel.

2.2.5.2 Dimensions and number of sections required

The quantity of trackers will depend on the panel manufacturer used and the final detailed design.

2.2.6 Scale drawings of panels including pad and transformer box.

See **Appendix C** – Panel Technical Data for panel dimensions and characteristics.

2.3. Construction Equipment and Delivery Vehicles

2.3.1 Types of construction equipment and delivery vehicles

The Project will consist of different equipment types depending on the phase of construction. The first phase, civil work and road building will consist of dozers, motor graders and rollers. The pile driving phase will consist of pile drivers. The pile drivers used will be a Vermeer PD10 or similar; **Appendix D** contains a representative pile driver which will be utilized by Two Creeks. After pile driving, installation of racking and panels will be supported mainly by skidsteers and telehandlers.

2.3.2 Gross vehicle weight (loaded and unloaded) for all vehicles using local roads

Except for the Main Power Transformer (MPT), delivery trucks will consist of legal load (80,000lb or less) over-the-road flatbed and box trucks. The site will receive an average of approximately 7-10 box trucks (modules) a day throughout the module delivery period and 2-5 flatbed trucks a day (inverters, piles, racking, misc.) during the pile driving period. The Main MPT will weigh approximately 200,000lb and be transported via rail to the nearest railyard and then using special multi-axle trucking and state road permits, as necessary, to the site.

2.3.3 For vehicles used for delivery (diagrams or drawings of vehicles are acceptable). Include:

2.3.3.1 Overall vehicle length

Except for the MPT, vehicles used for delivery will be standard over-the-road semi-trucks.

2.3.3.2 Turning radius

Turning radius will be the radius for standard over-the-road semi-trucks.

2.3.3.3 Minimum ground clearance

Minimum ground clearance will be the clearance for standard over-the-road semi-trucks.

2.3.3.4 Maximum slope tolerance

The routes to the site are relatively flat, and, therefore, so slope tolerance is not expected to be an issue.

2.3.4 Explain process for transportation, delivery and assembly of solar panels and associated equipment.

As construction progresses, the solar panels and other equipment will generally be delivered directly to the installation locations in a standard over the road truck. Fork lifts are used to unload pallets from the truck and place the pallets throughout the site. Some equipment will be delivered to the laydown area and then distributed as needed.

2.3.5 Roads and Infrastructure.

Estimate the potential impacts of construction and delivery vehicles on the local roads. Provide the following:

2.3.5.1 Describe methods to be used to handle heavy or large loads on local roads.

The MPT is the only equipment that will require something other than standard over-the-road flatbed trailers and box trucks.

2.3.5.2 Probable routes for delivery of heavy and oversized equipment and materials.

The most likely route for equipment transport is from Interstate 43 via Highway 147 and County Road V to Highway 42. Once the equipment is near the project the equipment will be delivered to the Project area using Nuclear Road or Irish Road.

2.3.5.3 Potential for road damage and any compensation for such damage.

Road damage during the construction phase of the Project is unlikely. Solar projects use mostly legal loads. If required, preconstruction video road survey can be completed prior to construction commencement to document current conditions. Upon completion of the project deliveries a post construction video survey can be completed to document roads. Any damage caused by the construction of the solar project will be repaired to as good or better condition.

2.3.5.4 Probable locations where local roads would need to be modified, expanded, or reinforced in order to accommodate delivery of equipment.

No modifications to local roads are expected.

2.3.5.5 Include an estimate of whether or not trees near or in road right-of-way (ROW) might need to be removed.

Tree clearing within the Project Area will be minimized to the extent practicable. If tree removal is necessary, the Project will either: (1) clear outside of the affected species nesting season and follow USFWS guidelines regarding acceptable dates for clearing in Wisconsin; (2) conduct nest surveys prior to construction to avoid impacts to active nests; and (3) coordinate with the WDNR prior to construction.

2.3.5.6 Provide an estimate of likely locations where local electric distribution lines will need to be disconnected in order to allow passage of equipment and materials

Local electric distribution lines will not need to be disconnected to allow for delivery of equipment and materials.

2.3.5.6.1 Describe how residents will be notified before local power would be cut.

Since local electric distribution lines will not need to be disconnected to allow for delivery of equipment and materials, there will be no cutting of local power, and, therefore, no need to notify customers of the loss of power.

2.3.5.6.2 Estimate the typical duration of a power outage resulting from equipment or materials delivery.

No power outages are required for the delivery of equipment and materials.

2.3.6 Construction Traffic. Anticipated traffic congestion and how congestion will be managed, minimized or mitigated. Include:

Local routes to the project site will have construction signage notifying deliveries and workers to reduce traffic. Signage will be posted to inform the general public of the additional construction traffic.

2.3.6.1 List of roads most likely to be affected by construction and materials delivery.

Table 2.3.6.1: Affected Roads

Affected Roads
State Highway 42
State Highway 147
Irish Road
Nuclear Road
County Road V

2.3.6.2 Duration of typical traffic disturbance and the time of day disturbances are most likely to occur.

The noticeable traffic increase will occur twice a day during the work week, which is Monday through Friday, when construction workers are traveling to and from the construction site. This increase will consist of the personal vehicles owned by the workers. Deliveries of equipment and material will generally be scheduled throughout the day versus during hours when residents are driving to and from work.

2.4. Other Project Facilities

2.4.1 Site Foundations. Describe the type of foundation or foundations to be used. If more than one type of foundation may be needed describe each and identify under what circumstances each foundation type would be used.

The project will use driven pier foundations and concrete foundations. The inverters will likely be installed on driven pier foundations but could be placed on concrete foundations if required by soil and geotech conditions. The MPT will be installed on a concrete foundation.

2.4.1.1 Dimensions, surface area and depth required for each foundation.

Foundation dimensions will be determined in the detailed engineering phase; generally the largest foundation will be the MTF which will be approximately 50' X 30'. The piers will be from 5' to 10' deep.

2.4.1.2 Amount of soil excavated for each foundation type.

For driven pier foundations, no excavation is required. For the concrete foundations, soil excavation quantities will be determined in the detailed engineering phase.

2.4.1.3 Describe how excavated soils will be handled including disposal of excess soil.

It is not anticipated that there will be any excess soil. The excavated soils will be graded back in after construction.

2.4.1.4 Materials to be used for the foundation.

2.4.1.4.1 Approximate quantity and type of concrete required for typical foundation.

Subject to detailed engineering, foundations will be standard reinforced concrete with compressive strength less than 5000 pounds per square inch.

2.4.1.4.2 Materials required for reinforcement.

The concrete will be reinforced with rebar.

2.4.1.5 Provide technical drawings of each foundation type to be used showing foundation dimensions.

See **Appendix X** for technical drawing of a typical main transformer foundation.

2.4.2 **Site Construction Area.**

2.4.2.1 Lay-down areas

The lay-down/staging area will be located off of Highway 42 between Irish Road and County Road V and will measure up to approximately 10 acres.

2.4.2.2 Parking area

Constructor worker parking will be included in the lay-down/staging area.

2.4.2.3 Provide a scale drawing showing the general construction setup for the sites.

The general construction setup will have construction trailers, employee parking, and some equipment storage located at the laydown yard/staging area. The initial phase of construction will consist of grading, trenching, and site road construction throughout the property. Depending on the final work sequence developed by the construction contractor, some areas will move into the next phase of construction including pile driving, racking installation, and panel installation. During this phase, equipment will be staged throughout the property as it is delivered to the site. This allows for more efficient work processes and minimizes down time. A detailed construction setup will be determined by the construction contractor closer to the start of construction.

2.4.3 Access Roads

2.4.3.1 Provide the total number of miles required for access roads.

Internal site access roads are expected to be between 12-15 miles in total length.

2.4.3.2 Describe materials to be used and methods for construction of access roads including road bed depth.

Construction of the internal site roads begins by removing the topsoil and organic material. Then the subgrade is compacted and constructed per civil design requirements. A layer of road base is added and compacted.

2.4.3.3 Specify the required width of access roads. Fully describe any differences between final road size and that required during construction.

Internal site roads are specified to be 16 feet wide during construction and for final operations.

2.4.3.4 Describe any site access control (i.e. fences or gates)

All project areas will be fenced using six feet of chain link with one foot of barbed wire. Each fenced area will have at least one entrance gate with access to a public road.

2.4.4 Transportation.

2.4.4.1 Explain why existing roads and access roads cannot be used and why

To get to the site, existing roads will be used. Once on site, new access roads will be required since the property being used is agricultural land and does not include roads. New access roads are needed to align with the Project's design and placement of equipment.

2.4.4.2 Description of materials to be used and methods for construction of new access roads

Construction of the internal site roads begins by removing the topsoil and organic material. Then the subgrade is compacted and constructed per the civil design requirements. A layer of road base is added and compacted.

2.4.4.3 Discuss when and how transportation paths would be removed and land recovered.

Removal of transportation paths is not needed since the internal site roads are specified to be 16 feet wide during construction and for final operations.

2.4.5. General Construction Areas

2.4.5.1 Identify size and location of lay-down areas outside of those found at the sites and any other areas used for material storage.

There are no lay-down areas planned outside of the one planned for the site.

2.4.5.2 Identify size and location of construction parking areas.

The construction laydown/staging area will also serve as a construction parking area.

2.4.5.3 Describe the expected use of these areas after project completion.

Upon completion of the Project, the lay-down/parking areas will be reclaimed. Aggregate material will be removed and stockpiled and the soils will be seeded and returned to a native vegetated state.

2.4.5.4 Provide a list of all hazardous chemicals to be used on site during construction and operation (including liquid fuel).

Expected hazardous chemicals include the following:

- Diesel
- Gasoline
- Oil
- Grease
- Spray Paint
- Galvanization paint

2.4.5.5 Discuss spill containment and cleanup measures including the Spill Prevention, Control, and Countermeasures (SPCC) and Risk Management planning for the chemicals proposed.

Two Creeks will develop and implement a Spill Prevention, Control, and Countermeasures (SPCC) plan to outline the procedures and preventatives measures for handling on-site chemicals during construction and operation. The SPCC plan will identify the following:

- Typical fuels, chemicals, lubricants, and paints to be used or stored in Project areas;
- Methods and locations of storage;
- Locations designated for lubrications and refueling;
- Preventative measures to be used during refueling;
- Mitigation measures to be employed in the event of a spill;
- Locations of construction spill kits and contents of kits (gloves, boom, sorbents, barrier material, etc.);
    - Emergency notification procedures and forms;
    - Contact information for individuals requiring notification if a spill should occur; and
    - Procedures for handling contaminated and spill response materials.

The SPCC plan will be maintained on-site during construction and operation and will meet all agency requirements.

2.4.6 Transmission and Distribution Interconnection

2.4.6.1 Describe any transmission or distribution grid interconnection requirement.

Any transmission interconnection and interconnection facilities requirements will be determined throughout the MISO interconnection study process. Two Creeks filed an Interconnection Request in June 2017 and is in the MISO August 2017 DPP Study Cycle. Two Creeks has been assigned queue position J886. At the time of this Application, the review of queue position J886 is not far enough along in the study process to have specific answers from MISO or the Transmission Owner about what transmission or interconnection facilities upgrades are required. Per the most recently updated DPP study schedule (posted by MISO on May 11, 2018), Two Creeks expects the first round of DPP 1 study results on August 31, 2018, the second round of DPP 2 study results on November 19, 2018, and the third round of study results on April 3, 2019.

2.4.6.2 Describe all communications and agreements, official or otherwise, with the transmission or distribution owner.

Two Creeks communicates with MISO, American Transmission Company, and Dominion Energy on a monthly basis regarding the J886 interconnection request and the Project. All three parties have been made aware of the Project and the design of the

generation tie-line route and have provided feedback on their preferred route of the tie-line and the Point of Interconnection within Dominion's Kewaunee Switchyard.

During the Commission's review process, Two Creeks will supply copies of the draft or final MISO reports for the Project.

2.4.7 Collector Circuits

2.4.7.1 Total number of miles of collector circuits required – separated by circuit type (overhead vs. underground).

Table 2.4.7: Miles of Collector Circuits

Circuit Type	Miles
Overhead	0
Underground	32

2.4.7.2 Specify the collector circuit voltage to be used.

The collector circuit voltage will be 34.5kV.

2.4.7.3 Transformer type, location, and physical size of transformer pad at each site.

The inverter pad mount transformers will be selected as part of a competitive bid process closer to the detailed engineering phase. The transformers are typically part of a skid assembly with the inverter(s) and the assembly is mounted on a driven pier or concrete foundation.

2.4.7.4 Underground Collector Circuits

2.4.7.4.1 Conductor to be used

The preliminary design assumes the conductor will be Aluminum. Insulation: 35kV TRXLPE, 100% insulation, (1/6, 1/3 and 2/3 concentric neutral depending on wire size), PVC Jacket overall. Cables are MV-105. Final specifications will be determined during the detailed engineering phase.

2.4.7.4.2 Burial depth and width of trench

Typical Burial Depth: 48"

1. Between Feeder F1 and F2, spacing is 3'.
2. Between Feeders F5 and F6 spacing is 3'.

3. Between Feeders F1, F2, F3 and F4, spacing is 3' between each feeder, making it a total width as 9'.
4. Spacing between all six feeders is 3', making a total width of trench as 15'.

2.4.7.4.3 Describe trench and how lines would be laid (direct buried, conduit etc.) Provide scale drawing of underground circuit.

Trenches will be approximately 48" deep and the width will vary depending on the number of circuits per trench. The feeder cables will be direct buried. See **Appendix W** drawings and further details.

2.4.7.5 Overhead Collector Circuits

2.4.7.5.1 Size of pole to be used.

The preliminary design assumes the Project will use underground collector circuits, and, therefore, overhead collection lines and poles is not anticipated. Any overhead circuits would be used in the unlikely case of unanticipated obstructions which do not allow for trenching or horizontal directional drilling.

2.4.7.5.2 Engineering drawing of structure to be used.

Since overhead circuits are not anticipated, no structure drawings have been provided.

2.4.8 Construction Site Lighting

Lighting equipment used during construction will consist of temporary light plants. The light plants are connected to a trailer and have generators to allow them to be transported around the project site. The laydown area and parking area may have lights mounted to poles to support construction during non-daylight hours.

2.5. Substation

2.5.1 A complete electrical description of required substation facilities including a list of transformers, busses, and any interconnection facilities required.

The Project will include a new collector substation with the following components:

- 34.5kV feeder risers;
- 34.5kV bus structure;
- Auxiliary transformer;
- 34.5kV main switch;
- 138/34.5kV main transformer;
- 138kV circuit breaker;
- 138kV dead-end structure with main switch;
- 138kV transmission lines leaving the substation;
- Shield wires;

- Control building; and
- Perimeter security fence with access gate.

Also see **Appendix B**.

2.5.2 Indicate the size (in acres) of the land purchase required for the new substation or substation expansion.

The land used for the collector substation is part of a larger piece of property available to the Project and will use approximately 0.71 acres.

2.5.3 Indicate the actual size of the substation or substation addition in square feet, the dimensions of the proposed substation facilities, and the orientation of the substation within the purchase parcel.

The preliminary design for the collector substation measures approximately 200 feet x 150 feet. The collector substation is oriented for the medium voltage circuits to approach from the south and the high voltage lines to exit to the north. See **Appendix H** for a preliminary general arrangement drawing of the substation.

2.5.4 Identify current land ownership and whether applicant has control of property or whether or not an option to buy has been signed.

Two Creeks will lease the land on which the collector substation is located. A contract to lease the land is expected to be executed by the end of June 2018.

2.5.5 Describe substation construction procedures (in sequence as they will occur) including erosion control practices (see Section 3.1).

Best Management Practices (BMPs), such as temporary seeding and silt fences, will be implemented prior to commencement of civil work beginning. Once BMPs are in place, grading and access construction will commence. Civil grading will be required to bring the pad to the engineered elevation. After the pad is complete, foundation work will commence. The foundations will consist of both poured piers and poured in place slabs. Grounding and underground conduit trenching will be construction at the same time as the foundations. Once foundations, grounding, and conduits are completed the installation of steel structures will commence. Once steel is erected, specialty equipment will be set and wired.

2.6. Operations and Maintenance Building

2.6.1 Describe the purpose and use of the proposed O&M building.

The proposed O&M building will be used as a work location for O&M workers and as a storage facility for equipment and spare parts.

2.6.2 Number of full-time employees that would be working at the facility.

Approximately three full time equivalents will be working at the facility.

2.6.3 Size of property needed (provide physical dimensions and acres).

The O&M building for the Project has not yet been designed, but a typical O&M building design for a project of this nature and size is approximately 2,900 square feet and measures 84 feet X 34 feet. The final design is expected to be smaller than this typical O&M building size. Total site property needed for the O&M building is less than one acre.

2.6.4 Building and Building Footprint

2.6.4.1 Provide a drawing or diagram of the O&M building with dimensions including square feet.

The O&M building for the Project has not yet been designed but a typical O&M building design is approximately 2,900 square feet and measures 84 feet X 34 feet. See **Appendix F** for a typical O&M building drawing.

2.6.4.2 Describe the type of building to be constructed (metal, frame, etc.)

The O&M building will be a single story metal shop and office structure on a reinforced concrete slab foundation with a gravel driveway and parking.

2.6.5 Lighting and Security Plan for O&M Property

2.6.5.1 Describe how the building property will be lit and how the lighting plan minimizes disturbance to nearby residences.

The O&M building will have motion activated lighting at each entrance door and in the parking lot. Activity in the O&M building will be almost exclusively during daylight hours, so lighting from the O&M building should not disturb nearby residences.

2.6.5.2 Describe any security plans for the property (fences etc.).

Two Creeks will implement security measures, including lock and keys for secure access to the O&M building and gates, as well as fencing surrounding the array. The O&M building will be located within this fenced area with six feet of chain link fence and one foot of barbed wire.

2.6.6 Describe any other facilities needed, including:

2.6.6.1 Parking lots.

A gravel parking area will be located next to the O&M building.

2.6.6.2 Sheds or storage buildings.

A separate shed or storage building is not required.

2.6.6.3 Supplies of water.

Water will be from local water distribution, if available, or from an on-site well.

2.6.6.4 Sewer requirements.

Waste water will use the local sewer system, if available, or a septic system.

3. Construction Sequence and Workforce

3.1. Construction Sequence

3.1.1. Provide the construction schedule for the proposed project. Include a timeline showing construction activities from beginning of construction to in-service. Identify all critical path items.

Table 3.1: Estimated Project Construction Schedule

Activity	Estimated Start	Estimated Completion
Construction Begins	August 2019	
Mobilization	August 2019	August 2019
Site Preparation and Road Construction	September 2019	October 2019
Drive Posts	October 2019	May 2020
Install Racking	October 2019	May 2020
Install Inverters	October 2019	May 2020
Install Modules	May 2020	November 2020
Construct Project Substation	April 2020	September 2020
Construct Gen-Tie Line	May 2020	August 2020
Commissioning	September 2020	December 2020
In-Service Date		December 2020

3.1.2. Provide a description of the staging and construction sequence required for building the proposed project. Include the delivery of materials.

Some materials will be stored in the laydown yard, but most materials will be delivered directly to the solar field and staged near the installation location.

3.1.3. Estimate of time required to complete construction.

The construction timeline will be finalized after an engineering, procurement, and construction contractor is hired. The construction timeline will be dependent on winter weather conditions and the ability to work through the winter months. Total time to complete construction is estimated to be approximately 16 months.

3.2. Workforce

3.2.1 Provide information on the workforce size and skills required for plant construction and operation.

During construction the work force will consist of equipment operators, laborers, and management personnel. The equipment operators will operate civil equipment, pile drivers, cranes, and material handling equipment, such as skid steers. The majority of the personnel required to construct a solar project are laborers that install racking systems and place modules. Approximately 300 workers will be needed to complete the project. Once construction is completed the plant will require approximately three full time personnel for O&M. The plant operators will have specific training that correlates with running a PV plant and a high voltage substation.

3.2.2 Estimate how much of the expected workforce will come from local sources.

Approximately 70 percent of the workforce is expected to come from local sources, depending on the labor market and their availability at the time of construction.

4. Project Maps, Aerial Photography, Photo Simulations, and GIS Shapefiles

4.1. Project Area Maps

A set of Project maps is provided in **Appendix A**. The maps showing the Project Area and other Project data on aerial photographs and include environmental, parcel, land use, and existing utility/infrastructure information. Also, included is environmental information required to support WDNR's review. Two Creeks will be providing electronic formats of the maps' Geographic Information Systems (GIS) data files separately on discs to the Commission.

4.1.1 General Project Area Map.

Please see maps labeled **Appendix A 4.1 Project Area Map and 4.1.1 General Project Area Map**. Both maps include the entire project area and reach at least 1 mile beyond the project area boundary and are of approximate scale 1:4800. The maps show the boundaries of the Project area, all proposed and alternative panel areas (symbolized differently and identified by number), any new collector substation facilities, O&M building and access roads.

4.1.2 Detailed Project Area Map.

Please see maps labeled **Appendix A 4.1.2 Detailed Project Area Map**. The scale for this map is larger than that of the general Project map so additional detail is clearly visible.

4.1.3 Topographic Maps

Please see maps labeled **Appendix A 4.1.3 Topographic Map and 4.1.3a Topographic Map Scaled.** The maps include the project boundary (and a 20-mile radius) all panel array sites (proposed and alternate), substation facilities, collector circuits, access roads, and O&M building.

4.1.4.1 and 4.1.4.2 Substation

Please see maps labeled **Appendix A 4.1.4.1 Detailed Substation Map.** The maps include the location dimensions and layout of any new substation, recent aerial photos of the substation site, the location of all power lines entering and leaving the substation. Please see **Appendix H – Substation Information** for a preliminary single line drawing of the substation that shows an engineering diagram of the substation and substation equipment including existing interconnection facilities.

4.1.5.1 and 4.1.5.2 O&M Building

Please see maps labeled **Appendix A 4.1.5.1 Detailed O&M**. The maps include the O&M building, parking area, roads, and other facilities and include a recent aerial

photograph of the property. Please find an engineering drawing of the O&M building in **Appendix F – O&M Building and Laydown Yard**.

4.1.6 Natural Resources and Land Use/Ownership Maps

4.1.6.1 Wetland maps.

Appendix A 4.1.6.1 is a figure displaying wetlands within two miles of the Project Area. This figure illustrates the Wisconsin Wetland Inventory (WWI) data acquired from the WDNR.

Additional detail on field and desktop delineated wetlands and waterways can be found within **Appendix A** where a large-scale mapbook of the Project area, facilities, wetlands, and waterways is provided on a current aerial background. The mapping extent of field and desktop delineated wetlands is only within the Project boundary near areas considered for the proposed facilities. Properties owned by non-participating land owners were not investigated; therefore, actual wetlands may continue beyond the edges of mapped features.

4.1.6.2 Land ownership maps, minimum scale 1:10,000 (map extent to 1.0 mile from the project boundary).

Appendix A 4.1.6.2 shows the following features: current parcel boundaries and landowners, roads, municipal boundaries, project boundary, solar arrays (proposed and alternate), access roads, collector circuits, and topographic contours.

4.1.6.3 Public lands.

Appendix A 4.1.6.3 is a figure displaying public and managed lands within two miles of the Project area. This figure illustrates public land data including national, state, and county forests; parks, trails, and other managed lands as identified through WDNR, USFWS, and USGS Gap Analysis data. Additionally, **Appendix A 4.1.6.3B** has been provided to illustrate similar data, as well as wetland data to a 20-mile extent. The intent of this map is to provide an overview of the region surrounding the Project.

4.1.6.4 Land cover.

Appendix A 4.1.6.4 is a figure displays the land cover types within the Project Area. Section 5.3 and Tables 5.3.2 and 5.3.3 provide summaries of the land cover types and those that will be impacted by Project construction or facilities.

4.1.6.5 Flood Insurance Rate maps (FIRMs) (within the project boundary). Provide flood insurance maps if the site is within one-half mile of a floodplain.

Appendix A 4.1.6.5 is a figure displaying the digital flood information within two miles of the Project Area. The figure displays digital Flood Insurance Rate Maps (FIRMS) data acquired from the Federal Emergency Management Agency (FEMA) website.

4.1.6.6 Soil Survey maps (within the project boundary)

Appendix A 4.1.6.6 is a figure displaying the Project Area. It illustrates soil information acquired from the USDA Natural Resources Conservation Service (NRCS) Soil Survey Geographic Database.

4.1.6.7 Bedrock maps (within the project boundary). Map showing depth to bedrock for the entire project area.

Appendix A 4.1.6.7 presents the bedrock geological information gathered for the Project area. The information is from state/regional-scale studies and not of sufficient scale to be used for siting. As part of the geotechnical study performed for the project area, eleven soil borings were conducted to a depth of 20 feet. No bedrock was encountered and is not expected to be a project constraint.

4.1.7 Community Maps

Please see map labeled **Appendix A 4.1.7.1 Zoning Map.** The map includes the Project area showing existing zoning out to 0.5 miles beyond the boundaries of the Project area.

Please see map labeled **Appendix A 4.1.7.2 Sensitive Areas Map.** The map includes the Project area showing proximity to schools, day care centers, hospitals, and nursing homes up to 0.5 miles from the substation site.

Please see map labeled **Appendix A 4.1.7.3 Airport Maps.** The map includes all runways from public airports within 10 miles of the Project boundary, all runways for private airports within 10 miles of the Project boundary, the project boundary and both the proposed and alternate solar array. There are no landing strips inside and within two miles of the proposed Project boundary.

4.1.8 Communication Infrastructure

Please see map labeled **Appendix A 4.1.8.1 Communications Maps.** The map identifies radio, microwave towards, and any NEXRAD or Doppler weather radar installations within a 50-mile radius of the project.

4.2.GIS Shapefiles – *Provide GIS shapefiles and attributes as listed below.*

All Project maps were created using ESRI ArcGIS Version 10.4 or higher. A spreadsheet of each GIS file, including the description of the data, the data source, and the date of when the data was generated or collected is provided as part of the GIS data disc,

Appendix I – GIS Data. GIS shapefiles provided on the data disc include all features described in Table 4.2 located, in **Appendix I – GIS Data**.

4.3. Topography – *Raster files of topographic features within the project area and surrounding landscape (10-mile radius of the project area).*

See **Appendix A 4.3** for site topographic maps.

4.4. Photo Simulations

Existing aesthetic conditions of the Project area and its vicinity were documented with photographs taken during May 2018. Prior to commencing the photo simulations for the Project, Two Creeks consulted with Commission staff in March 2018 on how to prepare and submit photos. A subset of photographs collected over the course of two site visits will serve as baseline images for the creation of visual simulations. The simulations will show rendered views that include the proposed solar arrays and collector substation as proposed in engineering and plan documents. The Visual Simulation Study is provided in **Appendix K – Photo Simulation Study**.

5. Natural and Community Resources, Description and Potential Impacts

5.1. Site Geology

5.1.1 Describe the geology of the project area.

The majority of Manitowoc County is covered with 10 to 300 feet of Quaternary aged gravel, sand, silt, and clay deposited as part of the Lake Michigan lobe during the Wisconsin Glaciation. Underlying these deposits is bedrock consisting of Silurian aged dolomitic limestone followed by Ordovician aged shale and dolomite of the Maquoketa Formation, then dolomite, limestone, and shale of the Sinnipee Group. Older sedimentary rock underlies these formations. The bedrock surface tends to dip eastward towards Lake Michigan at a rate of 30 to 40 feet per mile. Groundwater throughout Manitowoc County is generally present in Quaternary aged sediments with most potable water supplies drawn from the upper Silurian aged dolomite or deeper sedimentary formations.

The Project area is located in northeastern Manitowoc County and is relatively flat with gradual topographic changes. The majority of land cover and land use in the Project area is agricultural production; however, several rural residential areas exist. The Project area is present within the Lake Michigan Lacustrine Clay Plain ecoregion. This ecoregion supports diverse vegetation types and agriculture, and is characterized by red calcareous clay soil, lacustrine and till deposits, and a flat plain. Fertile soils make this area prime farmland, with a variety of crops present in the Project area. Native vegetation of this region is beech, maple, basswood, and oak forests. The Project area also contains numerous surface waters and wetlands; some of which are emergent and forested.

5.1.2 Geotechnical Report on Soil Conditions

5.1.2.1 Provide a summary of conclusions from any geotechnical report or evaluation of soils in the project area including:

- ***Results of soil borings including a review of soil bearing capacity and soil settlement potential.***
- ***Identify any soil conditions related to site geology that might create circumstances requiring special methods or management during construction.***

A preliminary geotechnical engineering report was prepared by Terracon Consultants Inc. The subsurface profile described in the report is the top 0.5-1.5 feet of soil are topsoil/root zone/clayey. Below that, soils are lean clay and silty clay. Based on the soil boring results, karst features, solution features, dispersive soils, collapsible soils, or expansive soils are not expected to be encountered. See **Appendix L** for the complete report.

5.1.2.2 Depth to bedrock

- ***Identify any sites where foundation construction must be modified because of the presence of bedrock.***

Bedrock was not encountered during geotech soil borings to a depth of 20 feet and is not expected to be a constraint.

- ***Describe construction methods and foundation issues associated with situations where bedrock formations are near the surface.***

No construction issues are expected due to bedrock formations.

- ***Discuss the likelihood or potential that construction on bedrock formations may negatively impact private wells within two miles of solar array sites.***

Construction on bedrock formations is not expected.

5.2. Topography

5.2.1 Describe the general topography of the project area.

General topography of the Project area is relatively flat with gradual topographic changes and some rolling contours. The majority of land cover and land use in the Project Area is agricultural production; however, several rural residential areas exist.

5.2.2 Describe expected changes to site topography due to grading activities.

Minimal grading is planned for the site.

5.3. Land Cover

Land cover within the Project area was identified using aerial photography and on-site field observations completed in November 2017. Land cover was digitized into a GIS layer to quantify the area by category with the land cover categories corresponding to those recommended by Commission guidance. The polygons of each land cover category were then clipped with Project boundaries and acreages for each resulting polygon were quantified with GIS software. The resulting acreages were summed by land cover category for the Project area.

Table 5.3.3 provides an estimate of the land cover area that will be impacted by the Project. Alternate array impacts are presented separately in the table. Land cover types are described in the following sections and include:

- Agricultural Land Use
  - Crop Land
  - Specialty Crops

- Undeveloped Lands
    - Grassland
    - Non-Forested Wetland
    - Forested Wetland
    - Upland Forest
- Developed and or Urban Land

5.3.1 Vegetative Communities in the Project Area.

Field habitat assessments were conducted in conjunction with wetland and waterway surveys in November 2017. The vegetative communities in the Project area are dominated by actively tilled agricultural crops, grassy swales, and areas of trees along field edges.

5.3.1.1 Agricultural

Agricultural areas identified in the Project area consists of actively farmed row crops including corn, soy beans, alfalfa, and winter wheat. No specialty crops were identified within the Project area.

5.3.1.2 Non-Agricultural Upland

Upland grasslands were dominated by American elm (Ulmus americana), Kentucky bluegrass (Poa pratensis), common wood sedge (Carex blanda), common plantain (Plantago major), red-osier dogwood (Cornus alba), sweet clover (Melilotus officinalis), Canada goldenrod (Solidago canadensis), barnyard grass (Echinochloa crus-galli), witchgrass (Panicum capillare), sandbar willow (Salix interior), Queen Anne's-lace (Daucus carota), reed canary grass (Phalaris arundinacea), quackgrass (Elymus repens), and smooth brome (Bromus inermis).

Upland forests were dominated by chokecherry (Prunus virginiana), dames rocket (Hesperis matronalis), stinging nettle (Urtica dioica), red-osier dogwood, box-elder (Acer negundo), black cherry (Prunus serotine), American elm and green ash (Fraxinus pennsylvanica).

5.3.1.3 Wetlands

Wetlands identified in the Project Area include hardwood swamp, wet meadow, shrub-carr, shallow marsh, and farmed wetlands.

Typical hardwood swamp vegetation included green ash (Fraxinus pennsylvanica), black ash (Fraxinus nigra), American elm (Ulmus americana), black willow (Salix nigra), and box-elder (Acer negundo) in the overstory, with dominant shrub/ground layer species including lake sedge (Carex lacustris), bristly buttercup (Ranunculus pensylvanicus), giant goldenrod (Solidago gigantea), nannyberry (Viburnum lentago), red-osier dogwood

(Cornus alba), reed canary grass (Phalaris arundinacea), sandbar willow (Salix interior), tussock sedge (Carex stricta), and devil's beggartick (Bidens frondosa).

Typical wet meadow vegetation included reed canary grass, narrow-leaf cattail (Typha angustifolia), common plantain (Plantago major), biennial wormwood (Artemisia biennis), box-elder, blunt spikerush (Eleocharis obtusa), Canada bluejoint (Calamagrostis canadensis), red-osier dogwood, tussock sedge, eastern woodland sedge (Carex blanda), barnyard grass (Echinochloa crus-galli), fall panicgrass (Panicum dichotomiflorum), sandbar willow, common reed (Phragmites australis), and peachleaf willow (Salix amygdaloides).

Typical shrub-carr vegetation found in the Project Area included reed canary grass, smooth brome, sandbar willow, red-osier dogwood, peachleaf willow, and green ash.

Typical shallow marsh vegetation included narrow-leaf cattail and reed canary grass.

Farmed wetlands had sparse vegetation, mostly consisting of agricultural weeds and stunted crops.

Table 5.3.1: Vegetative Communities in Project Area

Vegetative Communities in Project Area		
Agricultural	**Row/Traditional Crops**	Corn, soybeans, alfalfa, wheat
	Specialty Crops/Other	N/A
Non-Agricultural Upland	**Row/Traditional Crops**	Corn, soybeans, alfalfa, wheat
	Specialty Crops/Other	N/A
	Row/Traditional Crops	Corn, soybeans, alfalfa, wheat
Wetlands	**Hardwood Swamp**	Green ash, black ash, American elm, black willow, box-elder, lake sedge, bristly buttercup, giant goldenrod, nannyberry, red-osier dogwood, reed canary grass, sandbar willow, tussock sedge, and devil's beggartick
	Wet Meadow	Reed canary grass, narrow-leaf cattail, common plantain, biennial wormwood, box-elder, blunt spikerush, Canada bluejoint, red-osier dogwood, tussock sedge, eastern woodland sedge, barnyard grass, fall panicgrass, sandbar willow, common reed, and peachleaf willow.
	Shrub-Carr	Reed canary grass, smooth brome, sandbar willow, red-osier dogwood, peachleaf willow and green ash.
	Shallow Marsh	Narrow-leaf cattail and reed canary grass
	Farmed	Stunted crops, agricultural weeds

5.3.2 Acres of Land Cover Categories in Project Area

A summary of acreages for each land cover category is shown in Table 5.3.2.

5.3.2.1 Agricultural

Agricultural land cover includes actively cropped land. Cropland is the primary land cover found within the Project area. Approximately 1,559 acres of actively cropped land are located within the Project area. There are no areas of specialty crops, such as orchards or tree farms, within the Project area.

5.3.2.2 Non-Agricultural Upland

Non-agricultural uplands consist of forest, grasslands, old and fallow fields, and pasture lands. Within the Project area, there are approximately 49 acres of forested land, 35 acres of grassland, 3 acres of old field, and 26 acres of pasture.

5.3.2.3 Wetlands

Wetlands and waterways in the Project area were identified using field and desktop delineations. Approximately 29 acres of non-forested wetland, 53 acres of forested wetland, and 3 acres of open water are located within the Project area.

5.3.2.4 Developed Land

Developed lands include residential, commercial, industrial, and roadways. Maintained gravel, paved, or lawn areas surrounding buildings are considered developed and are included in the total acreage of developed land. The Project area includes approximately 58 acres of developed land.

Table 5.3.2: Acres of Land Cover Categories in Project Area

Acres of Land Cover Categories in Project Area		
Land Category		**Acres**
Agricultural	Cropland	1,559
	Specialty Crops	0
Non-Agricultural Upland	Forested	49
	Grassland	35
	Old Field	3
	Pasture	26
Wetlands/Waterbodies	Wetland	29
	Forested Wetland	53
	Open Water	3

Acres of Land Cover Categories in Project Area		
Land Category		**Acres**
Developed Land	Developed/Urban	58
Total		**1,815**

5.3.3 Land Cover Impacts

Land cover impacts are summarized in Table 5.3.3 by the land cover categories described in Section 5.3.2. Impacts have been calculated within GIS software utilizing the previously described land cover digitized dataset and polygons representing the footprints of Project facilities. Land within the solar array fence lines is considered impacted; however, the area, exclusive of access roads will be revegetated as described in Section 6.5.3.4. Several small, farmed wetlands are located within the fenced areas; however, they have been avoided in the design of the panel arrays.

Collector circuits will be installed utilizing direction boring methods; therefore, no temporary or permanent impacts to wetlands or waterways are anticipated. Less than 0.1 acre of temporary upland impacts associated with the collection bore pits is expected. Bore pits will be placed in previously disturbed, upland areas, to be determined prior to construction.

Table 5.3.3: Land Cover Impacts

Land Cover Impacts											
Land Cover Classification	**Primary or Alternate Array**	**Solar Array** (within fenceline, exclusive of access roads)[1]		**Array Access Roads**		**Collector Circuits**[1]		**Substation with Access Road**		**O & M Building and Laydown Yard**	
		Perm	**Temp**	**Perm**	**Temp**	**Perm**	**Temp**	**Perm**	**Temp**	**Perm**	**Temp**
Agricultural (Row/ Traditional Crops) [2]	Primary	763.4	0.0	22.7	0.0	0.0	13.0	0.9	0.0	0.0	9.7
	Alternate	185.6	0.0	4.4	0.0	0.0	0.9				
Non-Agricultural Upland (Prairie/ Grasslands/ Pasture/ Fallow Field) [3]	Primary	4.9	0.0	1.4	0.0	0.0	3.0	0.0	0.0	0.3	0.0
	Alternate	0.0	0.0	0.0	0.0	0.0	0.0				
Wetlands (wet meadow only impacted)	Primary	0.0	0.0[4]	<0.01[5]	0.0	0.0	0.0	0.0	0.0	<0.01[5]	0.0
	Alternate	<0.01	0.0	0.0	0.0	0.0	0.0				
Waterbodies	Primary	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.01[5]	0.0
	Alternate	0.0	0.0	0.0	0.0	0.0	0.0				
Developed and Residential (includes	Primary	0.0	0.0	0.2	0.0	0.0	2.3	0.0	0.0	0.0	0.0
	Alternate	0.0	0.0	0.1	0.0	0.0	0.1				

Land Cover Impacts											
Land Cover Classification	Primary or Alternate Array	Solar Array (within fenceline, exclusive of access roads)[1]		Array Access Roads		Collector Circuits[1]		Substation with Access Road		O & M Building and Laydown Yard	
		Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp
road ROW)											
Total	Primary	768.3	0.0	24.3	0.0	0.0	18.3	0.9	0.0	0.3	9.7
	Alternate	185.6	0.0	4.5	0.0	0.0	1.0				

[1] Impacts associated with collection system within arrays is included in "Solar Array" category.
[2] No specialty crops will be impacted.
[3] No upland woods will be impacted.
[4] Approximately 0.5 acre of wetland is located within array fence line; however, will be avoided by Project facilities.
[5] Wetland and waterway are located on an access road that serves both a primary array and the O&M building.

5.4. Wildlife

Wildlife habitat found within the Project Area was identified based on desktop habitat review, field investigations and observations, and state and federal information on threatened and endangered species.

5.4.1 Describe existing wildlife resources and estimate expected impacts to plant and animal habitats and populations.

The Project area contains suitable habitat for a variety of common Wisconsin wildlife and plant species. Typical mammals found in northeast Wisconsin include white-tailed deer, common raccoon, coyote, eastern gray squirrel, groundhog, and opossum. Numerous bird species may also be found in the Project area and vary depending on time of year. Wildlife may utilize agricultural fields to travel between preferred habitat, which is typically field edges, fallow fields, forests and wetlands. The Project will have minimal impact on wildlife species or their preferred habitats since the majority of impact from construction and operation will be on actively tilled agricultural land.

Summaries of the typical plant life located within the Project area and impacts of the Project can be found in Section 5.3 and Table 5.3.2.

5.4.2 Avian and bat pre-construction surveys

5.4.2.1 Provide a summary of pre-application consultation meetings held with DNR for the purposes of determining whether or not pre-construction bird and/or bat studies would be required for the project.

No bats were observed within the Project area during field habitat assessments; however, the Project area may contain suitable habitat for the Northern long-eared bat (NLEB). The WDNR Natural Heritage Inventory (NHI) database review indicates that there are no known bat occurrences within one-mile of the Project area. Further details regarding potential state and federally listed species has been provided in **Appendix M**.

Tree clearing within the Project area will be minimized to the extent practicable. If tree removal is necessary, the Project will: (1) clear outside of the affected species nesting season and follow USFWS guidelines regarding acceptable dates for clearing in Wisconsin; (2) conduct nest surveys prior to construction to avoid impacts to active nests; and (3) coordinate with the WDNR prior to construction.

5.4.2.2 DNR required avian and/or bat pre-construction

After consultation with the WDNR, it was determined that no pre-construction studies are required if tree clearing occurs outside of the nesting season. If clearing within potentially suitable habitat during red-shouldered hawk nesting season is required, Two Creeks will compete nest surveys and/or coordinate with WDNR prior to construction to determine the steps necessary to protect the nesting areas utilized by the red-shouldered hawk.

5.5. Public Lands

Public land use information was acquired from the WDNR including National, State, and County Forests; Wildlife Management Areas (WMAs); Parks; Trails; and other managed lands as identified through WDNR, USFWS, NPS, and USGS. Review of land ownership information for parcels in the Project Area was used to identify properties owned by federal, state, county, and township entities.

5.5.1 State properties, including: Wildlife Areas, Fisheries Areas, and State Parks

There are no public lands within the Project area. State properties within two-miles of the Project include: Two Creeks Buried Forest State Natural Area, Nipissing Swamp State Natural Area and the Point Beach State Forest. The western shoreline of Lake Michigan also lays within two-miles of the Project Area. The WDOT owns and manages approximately 145 acres of land adjacent to the Project northeast of State Highway 42 and Irish Road.

5.5.2 Federal properties, including: Wildlife Refuges, Parks, and Scenic Riverways

The Ice Age National Scenic Trail (Ice Age Trail) is a thousand-mile footpath that highlights Wisconsin's glacial history and the landscape that the flow and retreat of the ice created. The hiking trail is not complete or contiguous; however, official segments are connected by unofficial connecting routes that often include public roads. The Point Beach Segment of the Ice Age Trail is located approximately 1,500 feet from the Project at its closest point. The Project will likely not be visible from the trail due to the surrounding dense tree cover. Trail segments within two miles of the Project are shown on Figure 4.1.6.3 in Appendix A. An unofficial connector of this segment is County Highway (CTH) V, which is within the Project boundary. CTH V is a main county highway and has no special protection or scenic designation.

5.5.3 County Parks

Two Creeks County Park is a small local park located on Lake Shore Road and the shore of Lake Michigan. The park is within the two-mile buffer of the Project area. The park offers a picnic shelter, playground, parking, and boat launch to the lake. The park offers views of Lake Michigan; however, the solar array portion of the Project will not be visible from the park due to surrounding trees and distance.

The Manitowoc Public School District Rahr Memorial School Forest, which is part of the Manitowoc School District, is located within two-miles of the Project's eastern boundary. The school forest offers approximately 4.5 miles of trails and provides outdoor educational experiences for students and the surrounding communities. The forests and trails are generally located east of Lakeshore Road, west of Lake Michigan and within approximately one-half mile of CTH V. The Ice Age Trail runs through the school forests.

Table 5.5a: Public Lands in Project Area

Public Lands in Project Area	
State properties	None
Federal properties	None
County and Local Properties	None

Table 5.5b: Public Lands Within Two Miles Project Area

Public Lands Within Two Miles Project Area	
State properties	Two Creeks Buried Forest State Natural Area
	Nipissing Swamp State Natural Area
	Point Beach State Forest
	Lake Michigan

Public Lands Within Two Miles Project Area	
Federal properties	Ice Age National Scenic Trail (Ice Age Trail)
County and Local Properties	Two Creeks County Park
	Manitowoc Public School District Rahr Memorial School Forest

5.6. Local Zoning and Safety

5.6.1. Provide a list of potential local issues normally associated with zoning, road use and safety, or other condition uses.

On February 22, 2018, the Two Creeks Solar development team met with the Manitowoc County Planning and Zoning Department at their offices in Manitowoc. On March 28, 2018, the County provided a letter to Two Creeks concluding as follows:

> Wisconsin Stat. § 66.0401 makes plain, an owner may construct a solar energy system without a county zoning permit when the county lacks a procedure to determine if any permit it issues or any permit condition it imposes: (1) serves to preserve or protect the public health or safety; (2) does not significantly increase the cost of the system or significantly decrease its efficiency; or, (3) allows for an alternative system of comparable cost and efficiency. *Ecker Bros.,* 2009 WI App 112, ¶ 11. In this case, Manitowoc County does not have such a procedure in place. Thus, the County is without the authority to regulate the proposed solar energy system or require a zoning or setback permit for that system. *Id.,* ¶ 11.

The complete Letter is provided in **Appendix Q.**

5.6.1.1. Provide copies of all correspondence to and from local government pertaining to issues of zoning, safety, or local road use safety plans.

The County's Code Administrator, Reed Gaedtke, sent to Two Creeks several of the County plans with regard to zoning that provided general information about what the County would normally require if they were to issue a permit. **Appendix Q** includes the following County related documents: Chapter 8 General Zoning and Land Use Regulation, Chapter 9 Shoreland Zoning, Chapter 10 Setbacks, Chapter 29 Comprehensive Plan, Manitowoc County Parks and Recreation Plan, and the Manitowoc County Highway Development Plan.

5.6.1.2. Provide a discussion of how local concerns will be accommodated.

The County intends to forward any local concerns regarding the project to Two Creeks and to the Commission.

5.7.Land Use Plans

Copies of Manitowoc County's Chapter 8 General Zoning and Land Use Regulation, Chapter 9 Shoreland Zoning, Chapter 10 Setbacks, Chapter 29 Comprehensive Plan, Manitowoc County Parks and Recreation Plan, the Manitowoc County Highway Development Plan and Farmland Preservation Program Plan can be found in **Appendix Q**.

5.8. Historical Resources

Documentation on Two Creeks' coordination with the Wisconsin State Historical Society (WHS) can be found in **Appendix N**.

5.8.1 Provide a list of all historical sites potentially affected by the proposed project.

Two Creeks is currently completing a Phase I cultural resource review of archaeological and historical sites within the Project Areas of potential impact. The investigation includes a review of the WHS database to identify if the Project will have any impact on previously recorded historic properties. The WHS Wisconsin Architecture and History Inventory was reviewed by Stantec Consulting Services Inc. (Stantec) for listings within one mile of the Project boundary. See **Appendix N** for communication with the State Historical Preservation Office (SHPO). Table 5.8.1 lists the known sites located within the Project Area. The archaeological review identified 21 previously identified sites within the 0.5-mile of the Project site. Nine of the sites listed are located within the Project boundary (MN-0185, MN-0186, MN-0441, MN-0446, MN-0447, MN-0448, MN-0449, MN-0450, and MN-0453). No known cemeteries or burial sites are located within the Project boundary. The Project will have no effect on known cultural resources. All sites listed are within Manitowoc County. Specific locations are provided in the communications with SHPO.

Table 5.8.1: Potentially Affected Historical Sites

Historical Site	
MN-0185	T21N, R24E, Sections 10, 14
MN-0186	T21N, R24E, Section 25
MN-0441	T21N, R24E, Section 23
MN-0446	T21N, R24E, Section 15
MN-0447	T21N, R24E, Section 25
MN-0448	T21N, R24E, Section 25
MN-0449	T21N, R24E, Section 25
MN-0450	T21N, R24E, Section 25

Historical Site	
MN-0453	T21N, R24E, Section 25

Based on a review of the Wisconsin Architecture and History Inventory (AHI), there are two sites located within a one-mile radius of the Project: the Point Beach Nuclear Plant (AHI ID 65260) and Twin Elder School (AHI ID 65971). The Point Beach Nuclear Plant is located approximately 0.5 miles east of the collection system and approximately 0.6 miles north of the solar array. The Twin Elder School site is located adjacent to the Project boundary on Twin Elder Road; however, the school has been converted to a private residence and the original architecture has been modified (e.g., bell tower removed). The structure is not listed or eligible to be listed on the Nation Register of Historic Places.

5.8.2 For each proposed site, list the county, town, range, section and ¼, ¼ section in which construction would occur.

Construction activities will occur in northeastern Manitowoc County. Detailed areas of construction including the town, range, section, quarter-section, and quarter-quarter sections can be found on Figure 1 in Appendix N. Specific site locations are provided in the communications with SHPO.

5.8.3 For each historical resource identified, describe how the proposed project might affect the resource and how the project could be modified to reduce or eliminate any potential effect on the resource.

Site MN-0185 was surveyed in November 2017, during the field investigation described below. No historic resources were located during the field survey; therefore, the Project will not impact known resources associated with site MN-0185. Sites MN-0186, MN-0441, MN-0447, MN-0448 and MN-0449 which are located within areas of proposed solar arrays. The sites were field-investigated on May 12, 2018 and no cultural resources were located. The balance of the sites were avoided during design of the Project facilities. The Project, as designed, will not impact known historic or cultural resources.

No known historic or cultural resources will be impacted by construction or the Project. Pursuant to Federal and Wisconsin State laws, if grave markers or human skeletal remains are encountered during construction, all activities in the affected area will cease and the State of Wisconsin Burial Sites Preservation Office will be contacted for further instructions.

5.9. ER Review – Endangered, Threatened, and Special Concern Species and Communities

5.9.1 Provide a copy of the DNR approved ER review and all supporting materials

A Certified Endangered Resources (ER) review was submitted to the WDNR on March 6, 2018. The WDNR approved the ER review and provided concurrence and recommendations on March 8, 2018. A redacted public version of the certified ER Review is provided as **Appendix M.** A confidential version has also been provided to PSCW staff. The ER Review summarizes all state-listed rare species, natural communities, and other natural features with element occurrence records within one-mile of the Project segments for terrestrial and wetland occurrences. Appropriate follow-up actions will be coordinated with WDNR, as necessary.

Two Creeks presented preliminary Project information regarding natural and biological resources in the Project area to the USFWS on March 5, 2018. USFWS responded on April 24, 2018 with concurrence on a "no effect" determination to threatened and endangered species. **See Appendix M.**

5.9.2 Include a map showing the location of endangered, threatened and special concern species and/or their habitat, and natural communities identified on the ER Review that occur within a minimum of 1-mile of the proposed project area or as agreed to by the DNR. ER Reviews, supporting materials, and maps should be filed as confidential documents.

An ER Map is included as part of **Appendix A 2**.

6. Waterway/Wetland Permitting Activities

Two Creeks retained the services of Stantec to assess the wetland and water resources within the Project area and to prepare the associated water quality permit applications. Stantec completed field surveys for a portion of the Project Area in November 2018, with additional field surveys to be completed in May 2018. Detailed information on wetland and waterway locations, assessment methodologies, and applications for the required permits are provided in the most recent permit package, as submitted to the WDNR as part of this application (**Appendix O**). The information in this section applies to both proposed and alternate panel sites in the Project Area.

The permit package included in this Application is based on a combination of field and conservative desktop wetland and waterway delineations. Field verifications of desktop delineations will be completed in May 2018. The statistics presented in Section 6.0 represent the results of the 2017 field reviews and the conservative desktop review. An updated wetland and waterway permit will be provided to the WDNR following 2018 field review.

6.1. Waterway Permitting Activities

The WDNR Wetland/Waterway Impact Location Table and Environmental Inventory Table (Tables 1 and 2, respectively) are provided in **Appendix O**.

The Project was designed to minimize and avoid wetland and waterway impacts, as possible. There are a total of 55 wetlands and 12 waterways that were identified or delineated within the Project area. Of these, two wetlands and one waterway will be impacted by a Project access road and a security fence. The security fence is located on an alternate panel site.

6.2. Wetlands

The WDNR Wetland/Waterway Impact Location Table and Environmental Inventory Table (Tables 1 and 2, respectively) are provided in Appendix O. The two wetlands that will be permanently impacted by the Project are described below. **Appendix O** depicts the wetland and waterway permitting activities.

6.2.1 Identify all wetlands on a map

Appendix A 2 and 4.1.6.1 identifies mapped wetlands from the Wisconsin Wetland Inventory (WWI). It also identifies other wetlands or changes to WWI boundaries based on desktop and field delineations in accordance with relevant guidance documents.

6.2.2 Wetland Crossings

6.2.2.1 Describe the length of each wetland crossing.

Two Creeks designed the Project to avoid permanent wetland impacts with the Project, except for two disturbed wet meadow wetlands. Wetland 1-W6, which is associated with intermittent waterway 1-R4, is a roadside ditch adjacent to Irish Road. The Project will

construct a permanent access road for operations of the array locations south of Irish Road and to access the O&M building at this location. A total permanent impact of 240 square feet is expected. Wetland 1-W2 is a farmed wet meadow wetland located in an alternate solar array location. If this alternate location is constructed, a perimeter fence will result in 12.6 square feet of permanent impact. The total permanent wetland impact for the two wetlands is approximately 252.6 square feet. Two Creeks anticipates less than one-tenth of an acre of temporary impact due to construction matting at these locations.

6.2.2.2 For each crossing, identify wetland types

Table 6.2.2: Wetland Crossings

Crossing Description	Wetland Type (by WWI)	Wetland Type (by Plant Community)
Wetland 1-W2 – Alternate array fence	N/A	Wet meadow
Wetland 1-W6 – Access road approach	N/A	Wet meadow

6.2.2.3 Based on discussions with DNR staff during pre-application consultations, document the presence and percent cover of key wetland invasive species at each wetland crossing.

The Project area was evaluated for the presence of invasive species during field investigation in November 2017. The dominant species and general locations of the invasive species were noted on wetland delineation field maps in November 2017 to be used in Project planning. Final locations and types of invasive species will be updated at a date closer to construction.

6.2.3 Sensitive Wetlands

The WDNR provides on-line mapping applications and GIS data that was utilized to determine the locations of sensitive resources. No sensitive wetlands, state or federally listed waterways, trout streams, fisheries, wilderness areas, wild or scenic rivers, recreational areas, or other sensitive resources of state or federal concern are impacted by construction activities. No surface waters identified as outstanding or exceptional resources (Ch NR 102, Wis. Adm. Code.) are impacted. The East Twin River in the Town of Mishicot is the nearest surface water identified as outstanding or exceptional. Sensitive resources that are adjacent to the Project Area are described in Sections 6.2.3.1 – 6.2.3.14.

6.2.3.1 Cold Water Community as defined in Wis. Admin. Code § NR 102.04(3)(a), including trout streams, their tributaries, and trout lakes

No cold water communities, as defined in Wis. Admin. Code § NR 102.04(3)(a), including trout streams, their tributaries, and trout lakes are present within or adjacent to the Project area.

6.2.3.2 Lakes Michigan and Superior and the Mississippi River

No Project facilities will be located within 1,000 feet the shoreline of Lake Michigan. BMPs as described in Section 6.5 will be employed during construction of the Project; therefore, no impacts to Lake Michigan or its shoreline are anticipated.

6.2.3.3 State- or federally-designated Wild and Scenic River

No state or federally designated wild and scenic rivers are present within or adjacent to the Project area.

6.2.3.4 State-designated riverway

No state designated riverways are present within or adjacent to the Project area.

6.2.3.5 State-designated scenic urban waterway

No state designated scenic urban waterways are present within or adjacent to the Project area.

6.2.3.6 Environmentally sensitive area or environmental corridor identified in an area-wide water quality management plan, special area management plan, special wetland inventory study, or an advanced delineation and identification study

No environmentally sensitive areas or environmental corridors (as identified in area-wide water quality management plans, special area management plans, special wetland inventory studies, or advance delineation and identification studies) are present within Project Area. Several properties enrolled in the U.S. NRCS Wetland Reserve Program are located adjacent to the Project. These properties are displayed on Figure 4.1.6.3 – Public Lands. The properties will not be impacted by Project construction or operation.

6.2.3.7 Calcareous fen

No calcareous fens are present within or adjacent to the Project Area.

6.2.3.8 State park, forest, trail or recreation area

No state parks, forests, trails, or recreation areas are present within the Project Area. The northeast boundary of the Point Beach State Forest is located approximately 1,400 feet

southeast of the Project area. The Forest will not be impacted by Project construction or operation.

6.2.3.9 State and federal fish and wildlife refuges and fish and wildlife management area

No state or federal fish and wildlife refuges are present within or adjacent to the Project area. No fish and wildlife management areas are present within the Project area. The Pietroske Waterfowl Production Area, which is managed by the Leopold Wetland Management District of the USFWS, is located adjacent to the southern extent of the solar array. This resource will not be impacted by Project construction or operation.

6.2.3.10 State- or federally-designated wilderness area

No state or federal designated wilderness areas are present within or adjacent to the Project area.

6.2.3.11 State-designated or dedicated natural area

The Nipissing Swamp State Natural Area (SNA), the closest state designated natural area, is located approximately one mile southeast of the Project within the Point Beach State Forest. The SNA will not be impacted by Project construction or operation.

6.2.3.12 Wild rice water listed in Wis. Admin. Code § NR 19.09

No wild rice waters are present within or adjacent to the Project area.

6.2.3.13 Surface water identified as outstanding or exceptional resource water in ch. NR 102, Wis. Adm. Code.

No outstanding or exceptional resource waters are present within or adjacent to the Project area.

6.2.3.14 Other sensitive wetlands are deep marsh, northern or southern sedge meadow not dominated by reed canary grass, wet or wet-mesic prairie not dominated by reed canary grass, fresh wet meadows not dominated by reed canary grass, coastal marsh, interdunal or ridge and swale complex, wild rice-dominated emergent aquatic, open bog, bog relict, muskeg, floodplain forest, and ephemeral ponds in wooded settings.

No other sensitive wetlands are present within or adjacent to the Project area.

6.3. Mapping Wetland and Waterway Crossings

Mapped wetland and waterway crossings are provided in the WDNR Permit Application in **Appendix O**. Maps are provided on 11x17 inch layouts at 1:4,800 scale and include the following:

- Recent air photo showing only the proposed facility (access road, collector circuit, substation etc.) crossing or adjacent to wetlands or waterways.
- Topographic map showing the facility (road, collector circuit etc.) crossing or adjacent to wetlands or waterways.
- Recent air photos showing the locations of the following items:
    - Facility crossing or adjacent to wetland or waterway;
    - Waterways;
    - WWI (as a transpicuous layer);
    - Delineated Wetlands (clearly marked);
    - Hydric soils- (as a transpicuous layer) indicated faintly to be used as secondary review, if needed;
    - Proposed temporary bridge locations (labeled to correlate with Table 1); and
    - And, locations for other Chapter 30 activities such as grading or riprap (labeled to correlate with Table 1).

6.4. Waterway/Wetland Construction Methods

The Project is designed to minimize temporary and permanent impacts to wetlands and waterways to the extent practicable.

6.4.1 Waterway Crossings – Construction Methods

No temporary clear span bridges are anticipated to be utilized for crossing any identified waterways. One waterway will be permanently impacted by construction of a new permanent site access road. Waterways will be directionally bored for the installation of the underground 34.5 kV collection system. Workspaces associated with the subsurface boring will be placed in adjacent upland areas.

6.4.1.1 Describe specific methods to be used for crossings of any streams marked as perennial or intermittent on USGS topographic maps, including location and methods of construction for:

6.4.1.1.1 Access Roads

In one location, a permanent access road will impact a roadside ditch that contains a delineated waterbody and intermittent stream. In this location, the access road will be constructed utilizing a corrugated metal culvert of sufficient volume to maintain wetland and waterway flow and hydrology.

6.4.1.1.2 Collector Circuits

Collector circuits will utilize directional drilling to cross any waterways. At this time boring details are not formally known. A typical boring for a solar project is 6-12 inches in diameter and approximately 48 inches deep. The boring pit is approximately 48 inches deep and only large enough to complete boring actives. All boring bits will be setback from wetland areas.

6.4.1.2 Describe cleaning of machinery to prevent spread of invasive species.

Machinery will be cleaned prior to delivery. If cleaning is needed throughout construction, cleaning will take place on aggregate in the laydown yard. To prevent the spread of invasive species into other areas to the extent practicable, all equipment used, including construction matting, will be cleaned prior to work in areas without invasive species. If possible, construction matting for use in invasive species areas will be designated prior to the start of construction to minimize the time and expense needed to clean the mats.

6.4.1.3 Describe the proposed area of land clearance and disturbance at waterway crossings and the types of equipment proposed for the work.

The entrance to the O&M building requires crossing a ditch waterway. To allow for traffic access, an adequately sized culvert will be installed while minimizing impact to the waterway bedding. Once the culvert is in place, approved clean engineered fill or aggregate will be placed over the culvert to allow for a proper passage over the culvert.

6.4.1.4 In the case of underground construction for collector circuits, describe the proposed method for crossing the stream or river. For boring operations, provide the size, depth and location of boring pits and the estimated amount of excavated materials that will result.

Collector circuits will utilize directional drilling to cross any waterways. At this time boring details are not formally known. A typical boring for a solar project is 6-12 inches in diameter and approximately 48 inches deep. The boring pit is approximately 48 inches deep and only large enough to complete boring actives. All boring pits will be placed in upland areas, setback from wetlands.

6.4.1.4.1 Describe methods for de-watering of boring pit or structure foundations. Include a discussion of discharge locations and suspended solids standards for discharge water.

If dewatering is required, all water will be pumped away from any existing waterways and will be kept onsite. Water will be pumped to a vegetated area to help filter any soil particle that may be in the water.

6.4.1.4.2 Identify contingency plans for bore refusal and frac-outs if directional boring is proposed. Provide scaled pre and post-project diagrams for all crossings including top view and cross section or side views.

Contingency plans for bore refusal and frac-outs will be developed by the construction contractor prior to construction start.

6.4.2 Wetland Crossings – Construction Methods

The Project will result in permanent impacts to two wet meadow wetlands and may result in less than one-tenth of an acre of total temporary impact associated with construction matting at these locations.

6.4.2.1 Describe specific methods to be used for wetland crossings including location and methods of construction for:

Construction mats will be used to reduce impacts to wetlands or other sensitive areas; however, it is anticipated that the Project will cause less than one-tenth of an acre of total temporary wetland impact associated with construction matting. The construction matting dimensions are typically 4’ x 16’ x 1’. The use of the construction mats in wetlands will be determined by an examination of site specific soil stability, moisture content at the time of construction. Where possible, low ground pressure tracked equipment will be used to further minimize the use of construction mats and surficial wetland impacts.

6.4.2.1.1 Access Roads

One permanent access road, located at the proposed site of the O&M building and a solar array, will impact a roadside ditch containing a delineated waterbody and intermittent stream. At this location, the access road will be constructed utilizing a corrugated metal culvert of sufficient volume to maintain wetland and waterway flow and hydrology.

6.4.2.1.2 Collector Circuits

Collector circuits will be installed utilizing directional bore methods to avoid impacts to wetlands and waterways. Workspaces and bore pits associated with the subsurface boring will be placed in upland areas.

6.4.2.2 Describe cleaning of machinery to prevent spread of invasive species.

Equipment that is brought on site will be clean. If machinery needs to be cleaned throughout construction it will be cleaned in the laydown yard on an aggregate surface. To prevent the spread of invasive species into other areas to the extent practicable, all equipment used, including construction matting, will be cleaned prior to work in areas without invasive species. If possible, construction matting for use in invasive species areas will be designated prior to the start of construction to minimize the time and expense needed to clean the mats.

6.4.2.3 Describe the proposed area of land clearance and disturbance at wetland crossings and the types of equipment proposed for the work.

Permanent impacts are expected to one wetland associated with an intermittent waterway at a permanent access road location. The total wetland impact will be approximately 240 square feet. If temporary impacts to wetlands are unavoidable at the access road location, mats will be utilized for protection and pre-construction conditions will be restored to the extent practicable.

Additional impact to a single farmed wetland will occur for construction of a perimeter fence around an alternate array location, if that location is required. Permanent impacts associated with this fence are less than 0.001 acre. Temporary impacts associated with matting during fence installation will be less than 0.01 acres.

6.4.2.4 Describe methods and discharge locations for site de-watering, and locations for stockpile of fill materials.

If site dewatering is required during construction all dewatering will take place locally onsite. Water will be pumped to a well-vegetated area where it can be discharged without causing erosion. Work will comply with WDNR Technical Standards for dewatering.

6.4.2.5 In the case of underground construction for collector circuits, describe the proposed method for crossing the wetland. For boring operations, provide the size, depth and location of boring pits and the estimated amount of excavated materials that will result.

At this time boring details have not been developed. A typical boring for a solar project is 6-12 inches in diameter and approximately 48 inches deep below ground surface. The boring pit is approximately 48 inches deep and only large enough to complete boring actives. All boring pits will be setback from wetland areas and appropriate erosion controls used between the bore pit and the resource.

6.4.2.5.1 Describe methods for de-watering of boring pit. Include a discussion of discharge locations and suspended solids standards for discharge water.

If dewatering is required, all water will be pumped away from any existing wetland and will be kept onsite. Water will be pumped to a well-vegetated area to help filter any soil particle that may be in the water.

6.4.2.5.2 Identify contingency plans for bore refusal and frac-outs if directional boring is proposed. Provide scaled pre and post-project diagrams for all wetland crossings including top view and cross section or side views.

Contingency plans for bore refusal and frac-outs will be developed by the construction contractor prior to construction start.

6.5.Erosion Control and Storm Water Management Plan

6.5.1 Erosion Control Methods and Materials

See **Appendix R** for the preliminary Erosion Control Plan and Storm Water Management Plans.

6.5.1.1 Soil and slope stabilization

The existing condition of the project area will be bare earth and undesirable weeds from previous agricultural use. Temporary seeding of the entire project area, prior to other construction activities, including vegetative buffers will provide stabilization.

6.5.1.2 Seeding and mulching

Use native grass seed species applied using hydro-seeding or with a seed drill. Except areas designated to receive erosion control blanket, all disturbed portions of the site receiving seeding shall receive mulch. Mulch shall comply with the WDNR conservation practice standard 1085.

6.5.1.3 Matting, tracking pads, silt fences, stockpile protection

Construction mats will be used to reduce impacts to wetlands. The construction matting dimensions are typically 4’ x 16’ x 1’. The use of the construction mats in wetlands will be determined by an examination of site specific soil stability, moisture content at the time of construction. Where possible, low ground pressure tracked equipment will be used to further minimize the use of construction mats and surficial wetland impacts. Refer to **Appendix R** of the Erosion Control Plan for additional BMP detail.

6.5.1.4 Dewatering-related erosion and sediment control

If dewatering or pumping of water is necessary, all water from dewatering or trench draining activities must be discharged in a manner that does not cause nuisance conditions. It must not cause erosion in receiving channels, on downslope properties, or inundation in wetlands causing significant adverse impact to the wetland. If the discharge from the dewatering or pumping process is turbid or contains sediment-laden water, it must be treated through use of sediment traps, vegetative filter strips, flocculants, or other sediment reducing measures such that the discharge is not visibly different from the receiving water.

6.5.1.5 Channel protection

A small swale will be located around the proposed substation to ensure drainage to the proposed detention basin. Two Creeks will place fiber log as specified on sheet C-215 for channel/swale protection until vegetation is established.

6.5.1.6 Any other appropriate erosion control measures

See Erosion Control Plan/erosion control site map in Appendix R for additional detail.

6.5.1.7 Details and typical section drawings of all the erosion control methods utilized

The details and typical section drawings of all erosion control methods utilized are included in the Erosion Control Plan, which is included herein at **Appendix R**.

6.5.2 Erosion Control Measure Site Plan

6.5.2.1-6.5.2.6 Construction site boundary

See **Appendix R - Erosion Control Plan** in Appendix A, Exhibits 1-1 to 1-3, 2-1 to 2-3, and 3-1 to 3-3) for the construction site boundary, the location of all erosion control measures, the locations of stockpiled soil, vehicle equipment access sites, areas of disturbance, and drainage area configuration. The project site will be accessible from Nuclear Road, Twin Elder Road, Irish Road, and Mayer Road.

6.5.2.7 Surface water diversion measures

No surface water diversion methods will be utilized.

6.5.2.8 Topography

Site topography is predominantly very flat with some small areas which see slopes ranging from 5-8%. Most of the proposed project area is currently agricultural land with small ranges of woodland and grassland intermixed. Elevations across the project site range from 585’ to 665’

6.5.2.9 Existing floodplains and wetlands

The entire site lies in FEMA flood zone "X" which indicates an area of minimal risk and is outside the 1 percent and 0.2 percent annual chance floodplains (100 and 500-year floodplains). There are numerous delineated wetlands both surrounding and inside of the project area boundary. Wetlands within the project site will be protected from construction activities by utilizing silt fence and vegetative buffer strips.

6.5.2.10 Location of trees and unique vegetation

Tree clearing within the Project area will be minimized to the extent practicable. If tree removal is necessary, the Project will: (1) clear outside of the affected species nesting season and follow USFWS guidelines regarding acceptable dates for clearing in Wisconsin; (2) conduct nest surveys prior to construction to avoid impacts to active nests; or (3) coordinate with the WDNR prior to construction.

6.5.3 Sequence of Erosion Control Measures

6.5.3.1 Clearing and grubbing

The majority of the site will not require clearing and grubbing due to the existing condition of the site being tilled agricultural fields. Where clearing and grubbing is necessary, vegetation from within the array area. It is expected there will be approximately 5 acres or less of clearing and grubbing necessary.

6.5.3.2 Material installation

Appendix R – Erosion Control Plan (Appendix S) contains Wisconsin DNR BMP standards that describe in detail how BMP materials are to be installed.

6.5.3.3 Channel construction

A small swale will be located around the proposed substation to ensure drainage to the proposed detention basin. Two Creeks will place fiber log for channel/swale protection until vegetation is established.

6.5.3.4 Revegetation processes

Two Creeks will implement BMPs to minimize impacts to soil on the Project site so that in the future, the site may be returned to active agricultural practices. The BMP that will be part of the revegetation plan for the site include planting native species as well as those known to provide pollinator habitats. Two Creeks will consult guidance from leading organizations such as NRCS and Xerces Society to identify locally appropriate seed mixes, timing of application, and seeding techniques to be used in a revegetation plan for the Project.

6.5.3.5 Seeding and mulching/matting

Two Creeks will use native species applied using hydro-seeding or with a seed drill (Truax or equivalent). Except areas designated to receive erosion control blanket, all disturbed portions of the site receiving seeding shall receive mulch. Mulch shall comply with the WDNR conservation practice standard 1085.

Sequence of Erosion Control Measures

Phase I
Initial Stabilization

- At the start of construction, the project area will be bare earth and undesirable weeds will be removed from the previous agricultural land use.
- Temporary seed entire project area including vegetative buffers.

Phase II
Pre-Grading BMPs

- Install perimeter control including silt fence and rock construction entrance taking care not to disturb vegetative buffers planted in Phase I.
- Install all other erosion control BMPs that will not be affected by site grading.
- Initial erosion control devices will be left in place until final stabilization happens.

Phase III
Site Grading

- Mass grading in select areas on site. If topsoil is stripped during mass grading, it should be immediately respread at the completion of mass grading rather than stockpiled.
- Construct onsite gravel roads, which consists of stripping topsoil and constructing aggregate roads. Topsoil stripped from the aggregate roadways will be re-spread elsewhere onsite.
- Begin temporary stabilization and seed of mass graded areas that will not be disturbed for a period of 14 days.
- Complete any BMP installation that was required to be done after grading is complete.

Phase III
Solar Construction

- After completion of the site work, construction of the solar features will begin with pile driving. Piles will be directly driven with no excavation required.
- Trenching for underground electrical will commence at the completion of pile driving. Any stabilized ground that is disturbed by the trenching process will be immediately re-stabilized.

- If needed, Concrete pads will be constructed to support the electrical equipment.
- Racking and solar modules will be installed on the steel piles.

Phase IV
Final Stabilization
- Initiate permanent seeding.
- Once permanent seed is established at a uniform 70% coverage, remove all temporary control BMP's and stabilize any areas disturbed by their removal.
- Monitor stabilized areas until final stabilization is reached.

6.5.4 Off-Site Diversion Methods

No off-site diversion methods are anticipated to be used for this project.

6.5.4.1 Identify off-site contributions of water affecting project construction sites

Small areas of contributing sub-catchments will sheet flow onto the project site. See **Appendix R** – Erosion Control Plan (Appendix A, Exhibits 1-1 to 1-3) for reference.

6.5.4.2 Methods of controlling off-site water contributions

Off-site water contributions will be treated with on-site storm water discharge. No additional special considerations for off-site water contributions are necessary.

6.5.4.3 Site plan indicating:

6.5.4.3.1 Where the off-site water is originating from

See **Appendix R** – Erosion Control Plan (Appendix A, Exhibits 1-1 to 1-3).

6.5.4.3.2 Locations of diversion measures on-site

No off-site diversion methods are anticipated to be used for this Project.

6.5.5 Provisions for Inspection and Maintenance

6.5.5.1 The regular inspection of all erosion control efforts per the requirements of Wis. Admin. Code § NR 216.

6.5.5.1.1 Identify who will perform the inspections.

The construction contractor shall be responsible for conducting site inspections in compliance with the Wisconsin WPDES Permit.

6.5.5.1.2 Specify when the inspections will occur.

The construction site will routinely be inspected at least daily during construction activity.

6.5.5.1.3 Any special circumstances initiating an inspection.

The construction contractor must inspect the site within 24-hours after a rainfall event greater than 0.5 inches in a 24-hour period.

6.5.5.2 The regular maintenance of all erosion control efforts.

The construction contractor will be required to inspect all erosion prevention and sediment control BMPs and pollution management measures to ensure integrity and effectiveness during all routine and post rainfall event inspections.

6.5.5.2.1 Identify who is responsible for the maintenance.

The construction contractor is responsible for the inspection and maintenance of all temporary and permanent erosion control measures.

6.5.5.2.2 Specify corrective actions, if site is not maintained according to provisions.

If any site materials are not functioning properly, the inspector will note that and assign personnel to make the appropriate repairs or corrections. The inspector will review those locations to confirm the repairs or corrections were properly installed.

6.5.6 Post Construction Storm Water Management

6.5.6.1 Develop a storm water management plan per the requirements of Wis. Admin. Code § NR 216.47.

6.5.6.1.1 Where applicable, describe and provide details on the best management practices that will be used to meet the performance standards of Wis. Admin. Code § NR 151.12.

To ensure that at least 80% of total suspended solids are removed from site runoff, all runoff from new impervious aggregate roads is routed through vegetated buffer strips. The runoff from the impervious aggregate roads contains the heaviest concentration of pollutants. The runoff from solar modules also travels over a significant length of vegetation prior to leaving the site. By having flow lengths over vegetation equal to or greater than the flow length over any upstream impervious surface, sufficient pollutants are removed to comply with this post construction Total Suspended Solids Performance Standard.

To achieve the required post construction rate control, the approach will be to take advantage of a change in land use from annually rotated cropland to permanently

vegetated grass ground cover over a majority of the site. The existing site condition of straight row crops in Hydric Soil Group D has a NRCS Curve Number (CN) of 89. When converted to a fully vegetated meadow condition, the same soil has a CN of 78. The existing site composite CN is 88. Accounting for the proposed impervious aggregate areas, concrete areas, a portion of the impervious solar modules, and the vegetation planted below the solar modules, the proposed site composite curve number has been determined to be 84. The reduction in overall CN from 88 to 84 causes a reduction in the rate of stormwater runoff for all storm events.

Chapter NR 151.124 of the Wisconsin State Code has certain infiltration requirements dependent upon site conditions. However, infiltration will be exempt Per NR125.124 (4)(C)(2) which states "[w]here the least permeable soil horizon to 5 feet below the proposed bottom of the infiltration system using the U.S. department of agriculture method of soils analysis is one of the following: sandy clay loam, clay loam, silty clay loam, sandy slay, silty clay, or clay." The soils on the site are lean clays, the properties of this soils classification are not conducive to infiltration and therefore no infiltration will be required for the site.

6.6. Materials Management Plan

6.6.1 Haul Routes

6.6.1.1 Indicate how and where hauled materials will be routed, including:

6.6.1.1.1 Inbound materials

Materials will arrive at the general project area off of U.S 42. Once the trucks are on U.S 42 the materials will be brought onto either Nuclear Road or Irish Road. Once on Nuclear or Irish, the trucks will travel east until they arrive to the proposed driveway entrances.

6.6.1.1.2 Outbound materials

Outbound materials will head West on Nuclear or Irish Roads until they arrive at U.S 42. Once intersecting with 42, they will head north or south depending on their final destination.

6.6.1.1.3 Clean fill materials

At this time clean fill material providers have not been identified. The project site will procure clean fill from local providers near the site. It is anticipated that the clean fill materials will use U.S. 42 to travel to the project. Once in the vicinity of the site the deliveries will travel down Nuclear or Irish road.

6.6.1.1.4 Contaminated materials

Any contaminated materials that are discovered will leave the site on either Irish Road or Nuclear Road. From there the transportation will turn onto U.S. 42 and travel towards a qualified disposal location.

6.6.1.2 Alternate locations if necessary.

Not applicable at this time.

6.6.1.3 Include a haul route diagram indicating haul route locations.

Refer to **Appendix E** – Roads Infrastructure and Transportation for a diagram of potential haul routes.

6.6.2 Stockpile Areas

6.6.2.1 List and describe:

6.6.2.1.1 Material to be stockpiled

Solar field construction consists of materials being evenly spread throughout the site. Materials will be stored in the laydown yard and spread throughout the site boundaries. The goal will be for material to be offloaded at the installation location.

6.6.2.1.2 Where will material be stockpiled on-site

Material will be stockpiled throughout the solar array and in the laydown yard.

6.6.2.1.3 Measures to protect stockpiled areas, if applicable

Soil stockpiles will be protected per the site specific storm water plan to prevent erosion.

6.6.2.2 Provide a plan view diagram indicating stockpile area locations.

Specific stockpile locations have not yet been identified and will not be known until the construction contractor plans the work in more detail closer to the start of construction.

6.6.3 Equipment Staging Areas

6.6.3.1 Where equipment will be stored on-site

Equipment will be stored in the laydown yard and throughout the solar array. Some equipment will be left in place at the end of shift, while other equipment will be transported back to the laydown yard.

6.6.3.2 Include a plan of equipment storage areas on-site

The laydown staging area will include trailers for the construction contractors, parking space for workers, and temporary storage areas for equipment prior to delivery to the installation location.

6.6.3.3 Spill control and kits on-site

The site will have spill control kits stored throughout the site.

6.6.4 Field Screening Protocol for Contaminant Testing

6.6.4.1 How will the materials be screened

If soils are discovered that might have been contaminated, the soil will be removed and tested at a certified testing lab.

6.6.4.2 Where will the materials be tested

Two Creeks anticipates using Synergy labs for materials testing. Synergy is approximately a one-hour drive from the Project.

6.6.4.3 What protocols will be followed

If contaminated soils are found, construction in the area will stop until remediated. The area for potential contamination will be flagged off and remediated.

6.6.4.4 How work will be impacted

Work will be stopped in the area for potential contamination until remediated.

6.6.5 Estimated Types, Concentrations, and Volumes of Contaminated Materials

Contaminated materials are not known to exist on-site.

6.6.6 Methods for Dewatering of Excavated Materials

6.6.6.1 What methods will be used to correct the situation (i.e. how will water be removed)

The Project will have only small amounts of excavation. If during excavation, if the material is discovered to have too much water, it will be stockpiled next to the excavation and allowed to naturally dry.

6.6.6.2 Where these methods will take place on-site

Near the excavation location.

6.6.7 Estimated Volumes of In-channel and Upland Excavated Materials

6.6.7.1 Volume of Dredged Materials (cubic yards)

6.6.7.1.1 Excavation from bed and bank of waterway

No dredging is expected.

6.6.7.1.2 Excavation from wetland

No excavations from wetlands are planned.

6.6.7.2 Volume of Upland Materials (cubic yards)

There is a total of 16,213 cubic yards (CY) of cut and fill on site. This volume includes mass grading for the array racking and substation area only. This volume does not contain any addition grading potentially necessary for access roads.

6.6.7.2.1 Excavation from areas outside of waterway and wetlands.

There will be limited areas of grading for solar modules and trenching of the collector lines that will result in some excavation.

6.6.8 Estimated Volumes and Location of Re-used In-Channel and Upland Excavated Materials

6.6.8.1 Reuse of Dredged Materials

6.6.8.1.1 Provide the total volume of reused dredged materials in cubic yards.

No dredging is expected.

6.6.8.2. Reuse of Upland Materials

6.6.8.2.1. Provide the total volume of reused upland materials in cubic yards.

There is a total of 16,213 CY of material to be reused on site.

6.6.8.2.2. Provide the location either on project plans or provide off-site address, property owner, and site map drawn to scale.

Material will be spread to provide fill in areas throughout the site as needed.

6.6.8.2.3. Provide the purpose of the upland material usage.

Reused material will provide fill for areas currently out of tolerance for the proposed tracker system as well as fill for any other grading required on site.

6.6.9 Off-site Disposal Plans for Contaminated Materials and Non-Contaminated Materials

6.6.9.1 Disposal of Dredged Materials

There is no plan to dredge.

6.6.9.2 Disposal of Upland Materials

There is no contaminated material anticipated to be encountered on site based on preliminary information collected.

6.6.9.2.1 Total volume of disposed materials (cubic yards)

There is a total of 16,213 CY of material to be reused on site.

6.6.9.2.2. Disposal site location

The construction contractor will dispose of excess material on site as available to maintain allowable grading for tracker mounting system.

6.6.9.2.3. Type of disposal site (i.e. confined disposal facility, landfill, etc.)

Since this requirement pertains to grading and other site work that requires moving non-contaminated dirt around the site, the construction contractor will spread excess material on site as fill.

6.6.9.2.4. Disposal site name and address

Since this requirement pertains to grading and other site work that requires moving non-contaminated dirt around the site, this material will be spread on site.

6.7. Dewatering Plan

6.7.1. Dewatering/Diversion of Flow

No dewatering/diversion of flow is anticipated for the construction of the Project.

6.7.2. Downstream Impact Minimization

All areas to be part of the solar array will have a reduction in Curve Number resulting in a lower site discharge than the existing condition. The sub-station area stormwater runoff will be directed to and collected in a stormwater detention basin.

6.7.3. Analysis of Possible System Overload Scenarios

6.7.3.1. Estimated volume of system overload (i.e. what rainfall overloads the system)

Not applicable, because there are no permanent water quality features that could potentially overload.

6.7.3.2. Estimated frequency of system overload (i.e. how often will the system be overloaded)

Not applicable, because there are no permanent water quality features that could potentially overload.

6.7.3.3. Actions taken if stream is to be overloaded

Not applicable, because there are no permanent water quality features that could potentially overload.

6.7.4. Impacts of System Overload on Construction Activities and Water Quality

There are no permanent water quality features that could potentially overload.

6.7.5. Water Discharge Locations

6.7.5.1. Where water will be discharged

Water will continue to sheet flow and small channelized flow, as it did in its pre-developed state, to the surrounding wetlands.

6.7.5.2. How water will be discharged

Water will sheet flow through designed vegetative buffers before leaving the Project site and entering an existing wetland.

6.7.5.3. A site map indicating discharge locations

See **Appendix R**, Erosion Control Plan-Appendix A, Exhibits 3-1 to 3-3

6.7.6. Details of a Back-up System

6.7.6.1. What type of back-up system will be used (include backup and standby equipment/power supply)

No backup system will be necessary on this project, because there are no permanent water quality features proposed that could potentially overload.

6.7.7. High Flow Plan

The Project area is outside of any FEMA flood plains and the terrain slopes gradually to the east toward Lake Michigan. Flooding is not likely to occur on this project site.

6.7.8. Contaminated Water

The Project Area is primarily on agricultural lands, and, therefore, no contaminated water is expected on site. If unexpected contaminated water is encountered on site, the Project will follow procedures laid out in the Project SPCC plans. See Section 2.4.5.5 for a discussion of the SPCC Plan. Contaminated resources, if discovered, will be disposed of in accordance with applicable laws, ordinances, regulations, and standards.

7. Agricultural Impacts

7.1. Provide information on any ongoing farming activities on the proposed sites where construction activities will occur

7.1.1. Identify current cropping patterns.

In Manitowoc County, the two highest acreage crops are alfalfa/hay and corn. These two crops account for roughly 60% of the planted acres in the county with soybeans and winter wheat accounting for another 25% and a myriad of other crops making up the remaining 15%.

7.1.2. Identify the location of drainage tile or irrigation systems on the proposed sites.

Manitowoc County does not have a comprehensive file on all of the drainage tile or irrigation systems within the proposed project boundary. Per communication with the Manitowoc County District Conservationist within the Natural Resources Conservation Service at the US Department of Agriculture, Two Creeks received the files located provided in **Appendix J – County Drainage Tile Documents** identifying potential areas that may have drainage tiles or irrigation systems.

7.1.3. Provide information on any farmland preservation agreements for the proposed sites.

None of the proposed Project areas have farmland preservation agreements.

7.1.4. Indicate whether any lands within the project boundary are enrolled in the Conservation Reserve Program.

There is no land that will be used for the Project arrays that is enrolled in the Conservation Reserve Program.

8. Airports and Landing Strips

8.1. Public Airports

Please see **Appendix P** regarding nearby public and private airports within 10 miles from the project boundary and a summary of impacts from the Two Creeks Solar project.

8.2. Federal Aviation Administration

Please see **Appendix P** regarding notice requirements to the FAA. Due to the proposed heights of installations at the facility, no notices are required.

8.3. Wisconsin Department of Transportation – Bureau of Aeronautics – High Structure Permits

No structures on the Project that will require permits from the WDOT. As referenced in Section 1.8, the only permit required from the WDOT will be the DT1504 State Truck Highway Connection permit for the driveways required for the access roads for construction.

9. Electric and Magnetic Fields (EMF)

9.1. Provide an estimate of the magnetic profile created by collector circuits.

A study estimating the magnetic profile of the collector circuits is currently in progress and is expected to be provided as **Appendix G** by June 14, 2018.

9.1.1 Show a separate profile for the typical buried collector circuits. If some trenches would support more than one buried circuit, provide a separate estimate for each bundled configuration.

For **Appendix G**, separate profiles are being developed for typical collector circuits and areas where more than one circuit is located within a trench.

9.1.2 Show a separate profile for any overhead collector circuits.

There are no overhead collector circuits planned for the Project.

9.1.3 Assume all panels are working and project is producing at maximum capacity.

Appendix G will assume that all primary panels are working and producing at maximum capacity.

9.1.4 Show EMF profile at 0 feet, 25 feet, 50 feet, and 100 feet from the centerline of each circuit type modeled.

Preliminary magnetic profile estimates of four collector circuit configurations will be included in **Appendix G**. Table 9.1.4 provides a summary of the EMF configuration scenarios.

Table 9.1.4: Summary of EMF Configuration Scenarios

Summary	Max electric field (kV/m)	Magnetic field (mG) @ 100%
Trench F1 F2	0.7845	47.8874
Trench F5 F6	0.7845	43.9473
Trench F1 F2 F3 F4	1.0021	64.8455
Trench F1 F2 F3 F4 F5 F6	1.1866	65.0939

10. Noise

10.1. Provide existing (ambient) noise measurements and projected noise impacts from the project using the PSC's Noise Measurement Protocol.

On April 23 and 25, 2018, Stantec completed a pre-construction ambient sound survey of the substation and solar array areas for the Project to quantify the existing acoustical environment. Work was completed in accordance with the Commission document "Measurement Protocol for Sound and Vibration Assessment of Proposed and Existing Electric Power Plants" (the Commission's Noise Protocols). Aerial imagery, land ownership records, and field surveys were utilized to identify residences, schools, churches, hospitals, and other sensitive areas located near the Project.

Based on the Commission's Noise Protocols and the identified sensitive areas, seven baseline noise monitoring locations were selected. Four locations were chosen near the proposed substation and three near the proposed solar array.

Noise samples were taken at four periods throughout the day at each sampling location, as recommended by the Commission's Noise Protocols. The four periods included morning, midday, evening, and nighttime hours.

Noise levels recorded during the ambient noise survey indicated low background sound at all sites, with peaks occurring during times of peak traffic associated with commuters to local areas of employment. Ambient a-weighted sound levels ranged from approximately 49 to 56 decibels A-weighted (dBA) in the morning hours; 39 to 58 dBA at midday; 40 to 54 dBA in the evening; and 39 to 42 dBA in the nighttime. Results are typical of a rural environment with sources including vehicular traffic and farm machinery during the daytime periods and insect noise during the nighttime periods. Detailed results of the survey are set forth in **Appendix S**.

Expected noise levels were projected at the boundaries of properties near the proposed substation and array. The predicted sound level for the substation at approximately 300 feet is 45 dBA. The nearest residence to the substation is approximately 600 feet from the proposed location. Therefore, the sound expected at nearby residences will be less than 45 dBA.

The predicted sound level for an inverter cluster at approximately 100 feet is 37 dBA. This value is less than the nighttime impact required under Wisconsin Administrative Code PSC 128.14 of 45 dBA. This value is also at or very near the background ambient noise levels as recorded during the ambient noise survey. Due to the low level of noise 100 feet from an inverter site, the sound received at nearby receptors will not be cumulative. Therefore, the impacts of the inverters on the nearby residences will comply with Wisconsin Administrative Code PSC 128.14.

10.2. Provide copies of any local noise ordinance.

State and local noise regulations were reviewed, and no regulations directly applicable to a solar facility were identified. In the absence of existing pertinent regulations, and the Commission's Noise Protocols were utilized as a guideline for the Project.

10.3. Provide equipment manufacturer's description of noise attenuating methods and materials used in the construction of proposed equipment.

Noise resulting from the operation of the Project is anticipated to have minimal impact on nearby residences. No additional mitigation measures are anticipated if final equipment complies with the equipment specifications used for this analysis.

10.4. Describe how noise complaints will be handled.

In the event that there are noise complaints, Two Creeks will work with stakeholders in an attempt to mitigate, if appropriate, and resolve the complaint.

10.5. Discuss any mitigation measures that would be used to address noise complaints during the operation of the project.

As explained in Section 10.4, Two Creeks will work with stakeholders in an attempt to mitigate, if appropriate, and resolve the complaint.

11. Panel Glare

11.1. Provide an analysis showing the potential for glare from a typical project solar panel, and the project as a whole.

Please see **Appendix T – Glint Glare Studies**, which explains there is no potential for glare from the Project.

12. Local Government Impacts

12.1. Joint Development and Other Agreements

No joint development agreements are currently contemplated with the local government.

12.1.1.1 All services to be provided by the city, town, and/or county during construction and when the plant is in operation (e.g. water, fire, EMS, police, security measures, and traffic control).

The maximum construction workforce is expected to generate approximately 50 additional vehicle trips per day on each road within the Project area. Using any combination of state and county highways and other township roads throughout the Project Area, traffic impacts are considered negligible. The capacity of any route and level-of-service to the traveling public will not be affected. Construction traffic will be temporary with an anticipated duration of approximately 6 months. At the conclusion of the construction period, Project traffic will be minimal and associated with operations and/or maintenance activities. Traffic control on the part of the county will therefore be minimal.

The Project Area will have an O&M building with a physical address, allowing emergency units from police and fire to respond to any possible call. The Project will work with the local fire and police departments to ensure community readiness and the safety of facility employees and first responders. A fire safety protocol for the Project area will be made available to local departments.

12.2. Infrastructure and Service Improvements

12.2.1 Identify any local government infrastructure and facility improvements required (e.g. sewer, water lines, railroad, police, and fire).

Construction of the Project will require new aggregate-surfaced access roads. During operation of the Project, the access roads will be used by operation and maintenance crews while inspecting and servicing the solar panels. The permanent access roads will be maintained during the operation of the Project and unless otherwise requested by the landowner, will be returned to its original condition upon Project decommissioning. The location and construction of the Project's access roads and other infrastructure shall, to the extent reasonably possible, minimize disruption to farmland, the landscape, and agricultural operations within the county. Prior to construction, the Project will make arrangements (including obtaining necessary permits) with the governmental organizations with jurisdictional authority over each road for road use access, road intersections, maintenance, and repair of roads. Two Creeks will be responsible for all maintenance associated with the panels and private roads accessing the panels during Project operation. Additionally, the Project will enter into a road maintenance agreement with the Manitowoc County Road Department to ensure that all county roads within the Project area are repaired or restored to a condition at least equal to the road condition prior to construction of the Project. Prior to and after construction, the Project will contact the County Road Superintendent and request an inspection of the haul routes.

Where necessary, the Project will construct gates or fences. At the end of construction and throughout the life of the Project, the county and town will be left with improved road infrastructure. Besides maintaining roads, no other local infrastructure or facility improvements will be required.

12.2.2 Describe the effects of the proposed project on city, village, town and/or county budgets for these items.

There are no known effects of the proposed Project on the budget for Manitowoc County and the Town of Two Creeks.

12.2.3 For each site provide an estimate of any revenue to the local community (i.e. city, village, town, county) resulting from the project in terms of taxes, shared revenue, or payments in lieu of taxes.

Per Wisconsin State Statute 76.29, revenue to the local community in terms of taxes will be disbursed at the State level as determined by formula outlined in Wisconsin State Statute 79.04.

12.2.4 Describe any other benefits to the community (e.g. employment, reduced production costs, goodwill gestures).

The Project will enhance the road infrastructure and create improvements for widespread benefit. During construction, 200-300 jobs will be available for up to eight months with one to three full-time jobs once the Project is operating. Due to the higher volume of people, local businesses will experience an increase in revenue because the workers will require places to eat, sleep, buy food and gas, and other day-to-day amenities. The Project also intends to be an active community partner as well. The Project has funded and sponsored multiple events and items throughout the town such as the Manitowoc County Expo, Lakeshore First Robotics Team, Two Rivers Camp Invention Project, and mathematics-focused computer program for Magee Elementary School.

13. Landowners Affected and Public Outreach

13.1. Provide a separate alphabetized list (names and addresses) in Microsoft excel for each of the groups described below:

With the exception of the mailings list for Governmental Agencies that are provided in **Appendix U**, consistent with Commission practice, the mailing lists associated with the Application will be separately provided to the Commission.

13.2. List and describe all attempts made to communicate with and provide information to the public. Describe efforts to date and any planned public information activities. Provide copies of public outreach mailings.

Two Creeks Solar attended the Two Creeks Annual Town Meeting in April 2018 and presented the proposed Project. The meeting was well attended with about 40-50 residents, as well as, the Town of Two Creeks Board members. Two Creeks and the potential owners of the Two Creeks Solar facility are developing a public outreach plan with local and regional media outlets as the Definitive Agreements get close to being finalized and executed.

13.3. Describe plans and schedules for maintaining communication with the public (*e.g.* public advisory board, open houses, suggestion boxes, and newsletters).

On June 5, 2018, Two Creeks Solar will be presenting a check to Magee Elementary School in support of their new math program called Reflex Math in the Town of Two Rivers. Two Creeks Solar is the Dairy Cattle Sponsor of the Manitowoc County Fair and will have a booth at the fair on August 20, 2018 and will be arranging an open house in the Town of Two Creeks and Manitowoc County to answer any questions from community members or interested stakeholders.

13.4. Identify all local media that have been informed about the project. The list of local media should include at least one print and one broadcast.

Due the nature of the Project which involved other entities, no local media has been formally informed about the project at this time. The Two Creeks Solar development team has conducted a number of a local public outreach meetings and supported several sponsorship opportunities in order to inform the local community and municipality. Two Creeks Solar also has a land agent that has been directly communicating with landowners over the last 12-14 months about the project.