APPENDIX E

Decommissioning Plan

Decommissioning Plan for the Benton Solar Project in Benton County, Minnesota

Minnesota Public Utilities Commission Docket Numbers: IP7115/GS-23-423 and IP7115/ESS-24-283

AUGUST 2024

PREPARED FOR

Benton Solar, LLC

PREPARED BY

SWCA Environmental Consultants

DECOMMISSIONING PLAN
FOR THE BENTON SOLAR PROJECT
IN BENTON COUNTY, MINNESOTA

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1 INTRODUCTION

Benton Solar, LLC (Benton Solar), a wholly owned, indirect subsidiary of NextEra Energy Resources, LLC (NEER), is requesting two Site Permits from the Minnesota Public Utilities Commission (Commission) for the Benton Solar Project, a 100-megawatt (MW) alternating current (AC) nameplate capacity solar energy conversion facility (Solar Facility) and a 100-MW battery energy storage system, (BESS) and associated facilities to be located in Minden Township, Benton County, Minnesota (Benton Solar Project or Project) (Figure 1). The Project would produce, on average, up to approximately 201,480 megawatt hours (MWh) of solar energy annually, which is enough to power 21,500 homes. The Project will also include a 115-kilovolt (kV), 0.5-mile-long[1] transmission line to deliver energy from the Project to the electric grid. The proposed transmission line, which meets the definition of a high-voltage transmission line under Minnesota Statutes (Minn. Stat.) § 216E.01, subd. 4,[2] is presented in the Route Permit Application submitted to the Commission by Benton Solar pursuant to Minn. Stat. Chapter 216E, and Minnesota Administrative Rules (Minn. R.) Chapter 7850 (Commission Docket IP7115/TL-23-425).

The Site is the 951.4 acres for which Benton Solar has full land control. The Site encompasses the Preliminary Development Area, 631.9 acres, which is the area where development is expected to occur and encompasses all Facilities, with the exception of the operations and maintenance (O&M) building that is anticipated to be located off-site in an existing office space, and the transmission line which is addressed in the Route Permit Application (Commission Docket IP7115/TL-23-425). Facilities include all temporary and permanent features associated with the Project. Benton Solar anticipates a commercial operations date by the fourth quarter of 2027.

1.1 Plan Objectives

Commission Site Permits for large electric power generating plants require permittees to dismantle and remove project-related facilities and restore sites in accordance with a decommissioning plan. Permittees are required to file decommissioning plans with the Commission prior to commercial operation. The objective of this decommissioning plan is to ensure that the Site is restored to approximate preconstruction conditions in coordination with the landowner at the end of the Project's useful life or the expiration of the Site Permits (Commission Docket Nos. IP7115/GS-23-423 and IP7115/ESS-24-283), and that the restoration costs are borne by Benton Solar in accordance with the Site Permits and state laws. This decommissioning plan for the Project has been prepared to provide the following content per the Site Permit requirements:

- The anticipated life of the Project;
- The estimated decommissioning costs in current dollars;
- The method and schedule for updating the costs of decommissioning and restoration;
- The method of ensuring that funds will be available for decommissioning and restoration; and
- The anticipated manner in which the Project will be decommissioned and the Site restored.

[1] All measurements presented in this plan are approximate and hereafter have been rounded to the nearest tenth.

[2] Minn. Stat. § 216E.01, subd. 4 defines a high-voltage transmission line as "a conductor of electric energy and associated facilities designed for and capable of operation at a nominal voltage of 100 kV or more and is greater than 1,500 feet in length." The high voltage transmission line proposed by Benton Solar meets this definition because the voltage (115 kV) and length (approximately 0.5 mile) exceed the thresholds provided in the definition.

This plan describes in detail those activities, including the means and methods for removal of all Facilities and restoration of the Site to approximate preconstruction conditions, that Benton Solar will complete upon decommissioning. This decommissioning plan applies solely to the Project.

The Site is located 4.0 miles east of St. Cloud in Minden Township, Benton County, Minnesota, in a rural setting. Specifically, the Site is located in Township 36 North, Range 30 West, Sections 13 and 23–26.

Residences and small businesses are scattered throughout this rural area and land use is primarily agricultural. Additionally, existing transmission lines are located in the Site. The Site is generally bounded to the north by County Highway 50 (30th Street NE); to the east by County Highway 25 (75th Avenue NE); to the south by 2nd Street SE; and to the west by 55th Avenue NE.

1.2 Plan Updates

The anticipated life of the Project is 25 to 30 years. Benton Solar does not anticipate that the Project will be decommissioned sooner. However, decommissioning schedule updates will be provided in decommissioning plan updates. Benton Solar will update this decommissioning plan at the following times:

- Prior to construction;
- Every 5 years during Project operation; and
- At milestones such as a change in ownership and/or Site Permit amendment.

1.3 Project Description

The Project's preliminary Site design is shown in Figure 1, and Facilities and estimated dimensions are provided in Table 1. Information is based on the preliminary Site plan. Final design and construction of the Project may result in changes.

All associated facilities, with the exception of the O&M building that is anticipated to be located off-site, will be constructed within the Site presented herein (see Table 1). Secure fencing will encompass all Facilities within the Preliminary Development Area. associated facilities as defined in Minn. R. § 7850.1000 include electrical collection system, roads, fencing and security measures, substation, O&M facility and supervisory control and data acquisition system, meteorological evaluation tower, stormwater basins, and temporary features [e.g., laydown yards]).

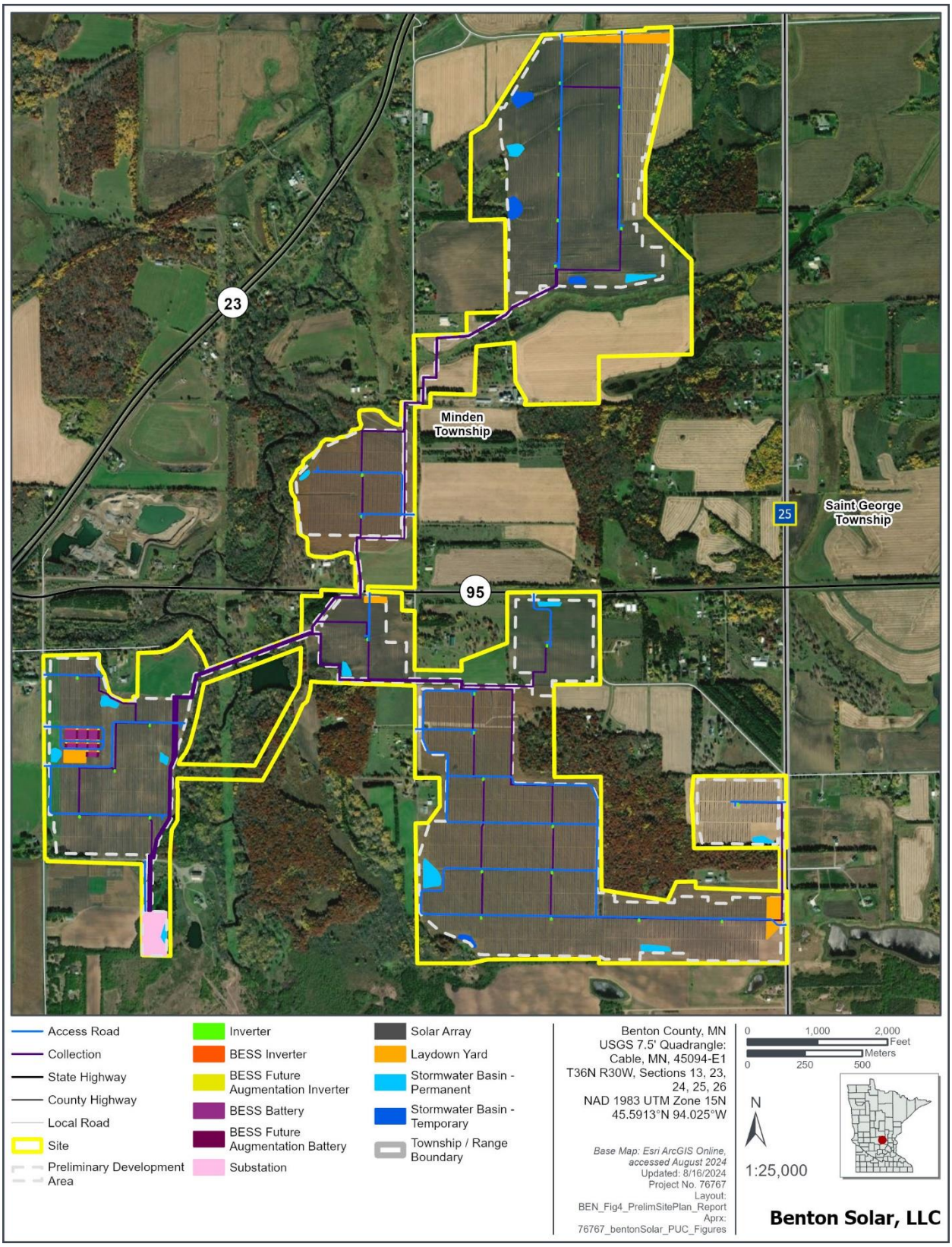

Figure 1. Benton Solar Project location and preliminary Site plan.

The Solar Facility portion of the Project will use solar panels to collect energy from the sun to produce direct current (DC) electrical power. Each row of panels will be connected in series to one another, becoming what is referred to as a string. A group of several strings will be connected and routed adjacent to the panels via DC cable that will be either aboveground in a hanging harness system or belowground in a filled trench. This DC cable will travel to a power conversion unit, which will house a DC/AC inverter and a transformer (together, a medium-voltage breaker) inside grounded, metal casing. Inverters will convert the 1,500-volt (V) DC power from the panels to 1,500-V AC power. Subsequently, the transformer will step up the power from 1,500 V to 34.5 kV (AC). A system of collection cables will then carry the generated power to the Project substation. The collection system will be located underground and will require the minimum number of splices and junction boxes needed to complete the run under the given site conditions and in consideration of cable reel limitations. Once delivered to the Project substation, the power will travel to a medium-voltage breaker, which will combine the feeds into the medium-voltage collection bus. The power will then go to the substation's step-up transformer that will convert the voltage from 34 kV to 115 kV, which is transmission voltage. From this step-up transformer, the power will travel through a high-voltage bus and additional substation electrical equipment necessary for protection and controls (in accordance with the Institute of Electrical and Electronics Engineers codes and National Electrical Safety Code) to a transmission line which will bring the power to the transmission owner's ring bus. From here, the transmission owner will send power to the grid.

The BESS portion of the Project will store power from the Solar Facility and/or the grid, allowing power to be distributed or collected at times when it is most advantageous. Individual battery cells form the core of the BESS. Battery cells are assembled either in series or parallel in sealed battery modules. Benton Solar will install battery modules in self-supporting racks that are electrically connected either in series or parallel. Individual self-supporting racks are then connected in series or parallel and terminated at a power conversion system. From the power conversion system, power will flow to the substation via medium-voltage cables that will be installed underground.

Table 1. Estimated Facility Acreages in the Preliminary Development Area

Facility	Acres*	
	Long-term Impacts	Short-term Impacts[∞]
Solar Facility		
Solar panels (including vegetative space between panels) [†]	510.8	0.0
Collection lines	0.0	39.7
Access roads[‡]	12.2	0.0
Laydown yards	0.0	5.4
Substation	5.0	0.0
Meteorological evaluation tower(s)	0.0	0.0
Power conversion units	0.1	0.0
Stormwater basins (permanent)	6.3	0.0
Stormwater basins (temporary)	0.0	3.0
Subtotal	**534.3**	**48.1**
Battery Energy Storage Site		
Laydown yard	0.0	1.2
Battery	0.5	0.0
Future augmentation battery	0.2	0.0

Facility	Acres*	
	Long-term Impacts	**Short-term Impacts∞**
Power conversion units	0.1	0.0
Future augmentation inverter	0.0	0.0
Subtotal	**0.8**	**1.2**
Operations and Maintenance Building§	**0.0**	**0.0**
Total	**535.1**	**49.3**

* Facilities and their estimated acreages are based on the preliminary Site plan. Final acreages may change pending final design. Additionally, there is some overlap between certain Facilities, which therefore may share acreage in this table.

† The Project consists of 260,208 individual panels. Each individual panel measures 7.5 × 3.75 feet. Tracker rows are generally 189.1 to 279.9 feet in length and consist of three strings of solar panels. These dimensions are preliminary and pending final design and equipment selection.

‡ The majority of access roads will be 10.0 feet wide with a 5.0-foot shoulder on either side. Access roads may be wider along internal road intersections, curves, and turnarounds. Two access roads, leading to the substation and BESS, will be 20.0 feet wide with a 2.0-foot shoulder on either side. Total length of access roads is 7.6 miles.

§ The O&M building is part of the Project but is anticipated to be contained in an existing office building located off-site. It is included here for totality of the Project description.

∞ Disturbances will be short-term, and areas will be restored as described in the Joint Site Permit Application (Commission Docket Nos. IP7115/ESS-24-283) following completion of construction.

1.3.1 Use of Power

Benton Solar submitted an interconnection request into the Midcontinent Independent System Operator (MISO) Definitive Planning Phase study process in 2019 and has an executed Generator Interconnection Agreement with MISO (dated December 7, 2022). Benton Solar is in the process of filing a surplus agreement with MISO for the BESS.

2 DECOMMISSIONING

Upon one of the decommissioning triggers listed in Section 2.1, Benton Solar will initiate the decommissioning and Site restoration process described in this plan. Benton Solar will implement all decommissioning activities in accordance with this plan, required state and local permits, and other Project plans (see Section 3).

2.1 Triggers

Decommissioning will be required under any of the following circumstances:

- The Site Permit expires, without renewal of said permit;
- Substantial action on construction of the Project is discontinued for a period of 12 consecutive months; or
- The Project does not generate electricity for a period of 12 consecutive months.

Benton Solar will notify the Commission, Benton County, other permitting authorities, and involved landowners if and when the Project is discontinued and decommissioning activities are planned to begin.

2.2 Schedule

Benton Solar anticipates that the decommissioning process will occur over a 5- to 9-month period depending on such conditions as seasonality and weather. Depending on the timing and the requirements

for revegetation, it is possible that revegetation and associated monitoring and maintenance efforts could extend beyond 9 months after all other decommissioning tasks are complete. Benton Solar assumes that no decommissioning work will be performed during a portion of winter months or during inclement weather (e.g., high winds, heavy rains).

2.3 Removal

Prior to decommissioning, participating landowners will be consulted to determine their desired future land use across the Site. Some Facilities, such as access roads, may be left in place if agreed to by the landowner. Decommissioning includes removal of Facilities as described below. All receiving facilities described below will be licensed or certified to accept the specific types of equipment and material discussed. Disposal of Facilities will meet the provisions of applicable state and local waste requirements.

- **Solar panels:** Solar panels will be inspected and tested prior to being disconnected and removed from racking. Operable panels will be packed and shipped to an off-site facility for reuse or resale. Nonworking panels will be packed and shipped for recycling or other appropriate disposal method at an appropriate facility. Benton Solar will assess resale options when the decommissioning plan is updated. Each solar panel for the Project measures 7.5 feet × 3.75 feet and weighs 64.0 pounds. The Project will have 260,208 solar panels. Panels can be easily disconnected, removed, and packed.
- **Racking:** Racking components will be disassembled and removed from steel foundation posts, sorted by size, and sent to a metal recycling facility. It is assumed that the racking structures weigh approximately 15.0 pounds per linear foot of array. The Project will include 1,047,792.0 linear feet of array, for a total weight of 7,858.0 tons. The racking making up the arrays is made of steel pipes. A crew with hand tools will disassemble and cut the pieces to sizes appropriate for recycling.
- **Steel foundation posts:** Steel foundation posts will be pulled out to full depth, removed, processed to an appropriate size, and sent to a recycling facility.
- **Cables and lines:** Benton Solar will remove all buried cables, with the exception of select boring locations (e.g., beneath the Elk River). The underground collector system cables are placed in trenches with a minimum of 18.0 inches of cover. Several cables/circuits are placed side by side in each trench. The conduits and cables can be removed by trenching. Cables and lines will be recycled or disposed of at an appropriate facility.
- **Inverters, transformers, and ancillary equipment:** All electrical equipment will be disconnected and disassembled, and all parts will be removed. The equipment will then be subject to one of the following actions: reconditioning and reuse, sold as scrap, recycled, or disposed of at an appropriate facility. The power conversion units will consist of inverter(s), a transformer, and a panel on a metal frame 19.0 feet long × 8.0 feet wide by × 8.5 feet tall. The power conversion units weigh approximately 32,000.0 pounds and will be disconnected by a crew of electricians. Transformers, which contain copper or aluminum windings, will be lifted by a mobile crane for transport to the recycling facility. Medium-voltage equipment and supervisory control and data acquisition equipment, enclosed in weatherproof cabinets, are mounted on the same equipment skids as the inverters and transformers. Their smaller size requires lighter equipment for removal.
- **Foundation posts or piles:** Foundation posts or piles will be removed completely, with the exception of substation deep foundations that will be removed up to a depth of 4.0 feet (see below). All materials will be disconnected and disassembled, and all parts will be removed. The foundation posts or piles will then be subject to one of the following actions: reconditioning and

reuse, sold as scrap, recycled, or disposed of at an appropriate facility. All concrete foundations will be removed unless directed otherwise by the landowner. Gravel from road removal will be used to backfill to within 6.0 inches of final grade and then completed with up to 6.0 inches of topsoil on all disturbed areas where necessary to achieve approximate preconstruction conditions. Concrete foundation removal will be accomplished with the use of excavators with concrete breakers. Processed concrete will be transported off-site under the same assumptions as road gravel. Clean concrete will be crushed and disposed of off-site or recycled and reused on- or off-site.

- **Fences:** All fence parts, including foundations, will be disconnected and disassembled, and all parts will be removed. The fence parts will then be subject to one of the following actions: reconditioning and reuse, sold as scrap, recycled, or disposed of at an appropriate facility.
- **Access roads:** Gravel access roads will be stripped. Compacted soils may require ripping to loosen before revegetation. Foreign road materials will be removed and reused or disposed of in accordance with local regulations. Roads would be restored so that they become a part of the natural surroundings and are no longer recognizable, to the greatest extent practicable, as needed or as agreed upon in landowner lease agreements. Road gravel would be used to backfill foundation locations to within 6.0 inches of final grade. Access roads located on agricultural land, assumed to be 50.0% of roads, will not be reseeded. Access roads will be left in place if the landowner desires, at which time the landowner will have responsibility for the access roads. All remaining access roads will conform to applicable Benton County regulations in effect at the time of decommissioning.
- **Substation:** All framing, fencing, foundations up to a depth of 4.0 feet, and electrical equipment such as conductors, switch gear, and transformers, will be removed, disassembled, and recycled or reused off-site. The aggregate base will be removed and recycled or disposed of at a designated off-site location.
- **Stormwater basins:** Benton Solar will grade stormwater pond areas to match surrounding contours and drainage patterns as much as possible, decompact soils, and spread topsoil to accommodate agricultural activities.
- **O&M building:** The O&M building will be removed from the existing office space and contents will be reused or disposed of appropriately.
- **BESS:** The BESS containers will be disconnected from electric ports prior to removal. Batteries will be prepared, packaged, and transported to a recycling facility. Energy storage system cabinets will be resold, reused, or recycled. Gravel will be removed and reused or disposed of in accordance with local regulations.

2.4 Waste Disposal

Benton Solar will dispose of materials by means of reconditioning, salvage, recycling, and disposal based on the removal and disposal details discussed herein. Benton Solar will then transport components and material to appropriate reconditioning, salvage, recycling, or disposal facilities in accordance with applicable state and federal law. For example, Benton Solar identified a metal recycling facility (EMR Northern Metal Recycling) in Becker, Minnesota, 15.0 miles from the Site. Benton Solar may haul recycling materials to this facility. If this particular facility is not in operation at the time of decommissioning, Benton Solar expects another facility would be. Benton Solar will identify the locations of facilities with the required certifications and ability to process materials during plan updates (Section 1.2). Modules sent for disposal will be sampled and tested using accepted test methods to

determine whether they must be managed as a Resource Conservation and Recovery Act Hazardous Waste.

These activities will occur throughout and within the Site as sequencing of decommissioning progresses.

2.5 Restoration

Benton Solar will restore the Site to approximate preconstruction conditions to the extent possible in coordination with landowners. Landowners may require the Site be returned to agricultural production or may retain restored vegetation, or other land uses as agreed between the landowner and Benton Solar. As of the time of preparation of this plan, Benton Solar anticipates that the majority of the Site will be restored to a farmable condition or seeded with a seed mix approved by the local soil and water conservation district or similar agency. The goal of restoration will be to restore natural hydrology, soil conditions, and plant communities to the greatest extent practicable. The restoration effort will implement best management practices to minimize adverse impacts, such as erosion and sediment runoff, to the extent practicable. BMPs may include the following:

- Minimize new disturbance and removal of native vegetation to the greatest extent practicable.
- Remove equipment and access roads, backfill with subgrade material, and cover with suitable topsoil to allow adequate root penetration for plants and so that subsurface structures do not substantially disrupt groundwater movements.
- Stabilize soils and return them to agricultural use if needed and according to the landowner direction.
- During and after decommissioning activities, install erosion and sediment control measures such as silt fences, bio-rolls, and ditch checks in all disturbed areas where potential for erosion and sediment transport exists, consistent with BMPs. Benton Solar may also use measures such as leveling, terracing, and mulching to prevent soil erosion and support establishment of target vegetation.
- During decommissioning activities, remove and stockpile topsoil in accordance with the Project's agricultural impact mitigation plan (see Appendix C of the Joint Site Permit Application [Commission Docket Nos. IP7115/ESS-24-283]), as well as designate and separate from other excavated material. Prior to Site restoration, topsoil will be decompacted to match characteristics of the surrounding area. Benton Solar will replace topsoil to its original depth and original surface contours to the extent practical. Benton Solar will mitigate topsoil deficiencies and settling using imported topsoil consistent with the characteristics and quality of soils in the Site, if necessary.
- Remediate any petroleum product leaks and chemical releases prior to completion of decommissioning in accordance with the stormwater pollution prevention plan (SWPPP).

2.6 Monitoring

The Project's National Pollutant Discharge Elimination System/State Disposal System Construction Stormwater General Permit, SWPPP, and/or other applicable permits and approvals may require post-restoration monitoring. If monitoring is required, Benton Solar will utilize a third-party environmental monitor to observe earthmoving and trenching activities, identify any decommissioning- or restoration-related issues impacting on-site and/or off-site areas, and recommend corrective actions, if any, to prevent/mitigate unanticipated on-site and/or off-site impacts. The environmental monitor will be responsible for communicating any environmental concerns and potential issues to Benton Solar, Benton Solar's contractors, affected landowners, and other relevant stakeholders in a timely manner. Benton

Solar will use discretion to either implement corrective actions or stop work, pending additional coordination. Benton Solar's environmental monitor will stay in routine contact with affected landowners and will conduct on-site check-ins until the National Pollutant Discharge Elimination System/State Disposal System Construction Stormwater General Permit is closed.

3 PERMITTING

All decommissioning and restoration activities will comply with federal and state permit requirements at the time of decommissioning. Decommissioning activity that will disturb more than one acre of soil may trigger the National Pollutant Discharge Elimination System Construction General Permit process. A SWPPP will be developed prior to filing a Notice of Intent. Permit(s), if required, shall be applied for and received prior to commencing decommissioning activity. If no discharge of dredged or fill material into a water of the United States takes place, neither a Section 404 permit from the U.S. Army Corps of Engineers nor a Wetland Conservation Act (WCA) permit will be necessary for decommissioning. The U.S. Army Corps of Engineers and the local governmental unit implementing the WCA will be notified in advance of the decommissioning work to verify the need for Section 404 or WCA permitting. If Section 404 permitting is required, a state Water Quality Certification permit will be required as well. State of Minnesota air quality rules will also be reviewed at the time the work is scheduled to determine if an air quality permit will be required. Should any interim permits become needed, they will be closed out with documentation of compliance after decommissioning.

4 COST ESTIMATE

4.1 Estimated Cost

The estimated cost to decommission the Project and restore the Site is a surplus of $1,229,700 in present-day dollars (Appendix A). This total was determined by subtracting the estimated salvage revenue of $14,440,284 from the estimated decommissioning and Site restoration cost of $13,210,665. Division of this estimated cost by the Project's anticipated 100 MW results in a surplus of approximately $12,297 per MW.

The salvage revenue is based upon the resale and scrap values of salvaged materials, including material salvaged from the solar panels, racking systems, and electrical equipment, rather than the sale and reuse of the equipment in other solar farm projects or other installations. The scrap market, which is impacted by macroeconomic events, is difficult to predict and will certainly influence cost estimates.

4.2 Financial Assurance Plan

Benton Solar will work with Benton County to identify, agree upon, and provide a means of financial surety (e.g., bond, letter of credit, escrow, or similar instrument) that makes Benton County the beneficiary should Benton Solar be unable to fulfill its decommissioning responsibilities and establishes that financial assurances will be paid in full no later than the end of the term of the Power Purchase Agreement.

Benton Solar also will coordinate with Benton County to establish an agreed-upon timeline for establishing the financial security and updating it as needed throughout the life of the Project. For example, in year 10 of the Project's operation life, a third party may determine the exact amount to be allocated for decommissioning that will assess the difference between estimated decommissioning costs

and the salvage value. Beginning in year 11 of the Project's operational life, Benton Solar would then either create a reserve fund, enter into a surety bond agreement, create an escrow account, or provide another form of security that would ultimately fund decommissioning and Site restoration costs, to the extent that the salvage value does not cover decommissioning costs. Financial assurances, whether implemented in a step-wise manner or not, will be paid in full no later than the end of the Power Purchase Agreement.

This plan will be re-evaluated every 5 years to allow for adjustments in the amount of surety and beneficiary, as needed.

4.3 Assumptions

Benton Solar established the scope of work and individual tasks for this decommissioning plan using professional experience. The Project was broken into individual tasks that were each estimated separately to include labor requirements, equipment needs, and duration. Production and labor rates were established using professional experience and published standards, including RSMeans (RSMeans 2024). After the estimate was completed, typical industry-standard average markups were applied for contingency, overhead, and fees. Estimating methods and assumptions specific to this estimate are as follows:

- Labor costs were developed through rates published by RSMeans, which are based on union wages averaged for 30 U.S. cities. Rates from St. Cloud, Minnesota, were used in the cost estimate. The labor rates include overhead and profit, which is inclusive of worker's compensation and other considerations.
- Equipment rates used in the estimate were developed by reviewing rates published by RSMeans and historical vendor quotes. Rates include fuel, maintenance, and wear and tear of ground-engaging components. Rates used assume the use of rented equipment, not owned.
- Mobilization and demobilization costs are estimated to be 15.0% of the overall contractor's costs. This reflects the actual cost to mobilize equipment, facilities, and crew to the Site. This amount covers costs of temporary facilities including one office trailer, two storage units, portable toilets, first-aid supplies, and utilities. This amount does not include the front-loading of costs from other tasks.
- Work was estimated on a unit-cost basis, priced by task, which follows the progression of work from start to finish. Unit costs are developed by including the labor, equipment, and production rate required for each individual task. RSMeans and the estimator's experience were used to establish the crew, equipment, and production for each individual task.
- Erosion and sediment control along roads reflects the cost of silt fencing on the downhill side of the road adjacent to wetlands and drainage swales.
- Perimeter control pricing is based on silt fence installation around downgradient sides of the Project perimeter.
- Final restoration will include the placement of up to 6.0 inches of topsoil on all disturbed areas where necessary to achieve approximate preconstruction conditions. Topsoil will be de-compacted and tilled to a farmable condition. Areas not returned to agricultural use (if any) will be revegetated using a seed mix approved by the local soil and water conservation district or similar agency. It is assumed that 50.0% of the topsoil required for restoration is available on-site as a result of Project installation.

- Field management during construction includes costs for one superintendent, one health and safety representative, and two field engineers. These positions are critical to the safe and successful execution of work.
- A contractor's home office, project management, overhead, and fee can vary widely by contractor. As such, averages were developed for the estimate and added as a percentage of total cost. These include 5.0% for home office and project management. Contractor contingency costs are not included. Several other miscellaneous costs have been approximated, including permits, engineering, signage, fencing, traffic control, and utility disconnects. In the context of the overall estimate, these are incidental costs that are covered in the estimate markups.
- Solar module degradation is 0.50% per year, or 88.0% after 25 years. There is currently a robust market for used solar panels and pricing can be found on eBay and other sites. It is assumed that as long as the modules are producing power, they will have economic value. To avoid overestimating the used modules' value, Benton Solar used the minimum pricing of approximately $0.07 per watt based on a We Recycle Solar quote prepared on October 22, 2020. Pricing is based on delivery to their facility. For interim decommissioning, resale of used modules will be most cost effective.
- A metal recycling facility (EMR Northern Metal Recycling) is located in Becker, Minnesota, 15.0 miles from the Site. Metal salvage prices for the midwestern United States (e.g., steel, aluminum, copper) are based on May 2024 quotes from Scrap Monster (2024). Posted prices are 3 months old. These prices are based on delivery to the recycling facility with the material prepared to meet size, thickness, cleanliness, and other specifications. A reduction of 25.0% has been taken from this price to reflect the processing by the contractor to meet the specifications.
- The steel foundation posts weigh approximately 150.0 pounds each, and hauling costs are estimated at approximately $0.83 per ton per mile.
- Hauling the steel to Becker, Minnesota, would cost about $4.15 per ton.
- The steel posts and array racking are priced at $331.12 per ton based on #1 heavy melting steel, plus a 25% discount for processing.
- There is an active market for reselling and recycling electrical transformers and inverters, with several national companies specializing in recycling. However, Benton Solar has assumed that the electrical equipment will be obsolete at the time of decommissioning, so Benton Solar has based the pricing on a percentage of the weight that reflects the aluminum or copper windings that can be salvaged. Pricing was obtained from Scrap Monster (2024). Benton Solar has assumed a 25.0% recovery of the weight of the transformers and inverters for aluminum windings.
- The collection lines are priced assuming copper conductor wire for the direct current circuits, which is typical. The prices reflect a reduced yield of copper resulting from the stripping of insulation and other materials from the wire prior to recycling. The estimate uses the Midwest price of #2 insulated copper wire with a 50.0% recovery rate as found on Scrap Monster in May 2024 (but representative of 3 months prior), which is $1.29 per pound.
- All Project Facilities, including their approximate size and weight, will be disposed of as described in Section 2.4.

5 LITERATURE CITED

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APPENDIX A

Decommissioning Cost Estimate, Benton Solar Project, Benton County, Minnesota

Westwood

Decommissioning Cost Estimate

Benton Solar Project

Benton County, Minnesota

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Project Number: 0041811.01

Date: May 31, 2024

Benton Solar Project

	Quantity	Unit	Unit Cost	Total Cost
Mobilization/Demobilization	1	Lump Sum	$1,575,100.00	$1,575,100
Mobilization was estimated to be approximately 15% of total cost of other items.				
Permitting				
County Permits	1	Lump Sum	$10,000.00	$10,000
State Permits	1	Lump Sum	$20,000.00	$20,000
Subtotal Permitting				$30,000
Decommissioning will require SWPPP and SPCC Plans. Cost is an estimate of the permit preparation cost.				
Civil Infrastructure				
Remove Gravel Surfacing from Road	10,260	Cubic Yards (BV)	$3.01	$30,883
Haul Gravel Removed from Road to Landfill (Becker, MN)	12,825	Cubic Yards (LV)	$14.25	$182,732
Dispose of Gravel Removed from Road (Landfill uses as Daily Cover)	16,621	Tons	$0.00	$0
Remove Geotextile Fabric from Beneath Access Roads	62,410	Square Yards	$1.40	$87,374
Haul Geotech Fabric to Landfill (Becker, MN)	17.0	Tons	$10.45	$178
Dispose of Geotech Fabric	17.0	Tons	$81.00	$1,377
Remove and Load Culvert from Beneath Access Roads	15	Each	$420.00	$6,300
Haul Culvert Removed from Access Roads to Landfill (Becker, MN)	4.5	Tons	$10.45	$47
Dispose of Culvert	4.5	Tons	$81.00	$365
Remove Low Water Crossing from Access Road	9	Each	$3,400.00	$30,600
Haul Low Water Crossing Materials to Landfill (Becker, MN)	360.0	Ton	$10.45	$3,761
Dispose of Low Water Crossing Materials	360.0	Ton	$30.00	$10,800
Grade Road Corridor (Re-spread Topsoil)	40,836	Linear Feet	$1.28	$52,270
Decompact Road Area	12.9	Acres	$222.97	$2,876
Remove Chainlink Fence (Substation, BESS, O&M, etc.)	1,950	Linear Feet	$7.68	$14,976
Haul Chainlink Fence to Metal Recycling (Becker, MN)	10	Tons	$4.95	$49
Remove Agricultural Fence	57,537	Linear Feet	$2.71	$155,925
Haul Agricultural Fence to Metal Recycling (Becker, MN)	89.2	Tons	$4.95	$441
Subtotal Civil Infrastructure				$580,955
Civil removal costs are a combination of MNDOT unit costs where applicable, RSMeans cost for St. Cloud, and industry standards provided to Westwood.				
Structural Infrastructure				
Remove Steel Foundation Posts (Arrays)	44,164	Each	$16.60	$733,122
Remove Drive Motor Posts	3,535	Each	$16.60	$58,681
Remove Steel Foundation Posts (Equipment Skids)	232	Each	$16.60	$3,851
Haul Steel Post to Metal Recycling (Becker, MN)	3,434	Tons	$4.15	$14,251
Remove Tracker Racking per String	10,008	Each	$205.07	$2,052,341
Haul Tracker Racking to Metal Recycling (Becker, MN)	7,858	Tons	$4.15	$32,611
Haul Drive Motor Posts to Metal Recycling (Becker, MN)	255	Tons	$4.15	$1,058
Subtotal Structural Infrastructure				$2,895,915
Steel removal costs were calculated by using RSMeans information for demolition of steel members.				
Hauling calculations are based on the locations of metals recyclers.				
Electrical Collection System				
Remove PV Panels	260,208	Each	$5.67	$1,475,379
Haul PV 95% of Panels to Reseller (Louisville, KY)	8,005	Tons	$193.43	$1,548,369
Haul 5% of PV Panels to Landfill (Becker, MN)	421	Tons	$13.96	$5,877
Dispose of PV Panels	421	Tons	$81.00	$34,101
Remove Combiner Boxes	29	Each	$60.00	$1,740
Remove Equipment Skids	29	Each	$1,167.48	$33,857
Remove Equipment Pad Frames and Foundations	29	Each	$3,178.10	$92,165
Haul Equipment to Transformer Disposal (Albany, MN)	29	Each	$249.25	$7,228
Remove SCADA Equipment	1	Each	$2,000.00	$2,000
Remove DC Collector System Cables (copper)	140	Per MW	$2,000.00	$280,000
Remove Underground (AC) Collector System Cables	75,288	Linear Feet	$2.77	$208,548
Load and Haul Cables for Recycling	1,218	Tons	$4.15	$5,055
Subtotal Electrical Collection				$3,694,319
Electrical removal costs of PV Panels and Combiner Boxes were based industry standard installation rates. Equipment pads, MV Equipment, and SCADA Equipment removal cost are based on removal of equipment, concrete pads, and conduits using a truck mounted crane and RSMeans information on crew production rates.				

Substation				
Disassemble and Remove Main Power Transformer(s)	2	Each	$4,500.00	$9,000
Haul Transformer(s) Offsite	547	Tons	$9.97	$5,454
Haul Transformer Oil Offsite	25,660	Gallons	$0.09	$2,309
Dispose of Transformer (Including Oil) (Salvage Value)	2	Each	$0.00	$0
Excavate Around Transformer Foundation(s)	2	Each	$1,920.83	$3,842
Remove Complete Transformer Foundation(s)	167	Cubic Yards	$163.74	$27,345
Backfill Excavation Area from Transformer Foundation Removal	169	Cubic Yards	$43.15	$7,292
Haul Concrete (Foundations Transformer, Switch Gear, etc.)	339	Tons	$24.75	$8,389
Dispose of Concrete from Transformer Foundation	339	Tons	$50.00	$16,950
Demolish Substation Site Improvements (fences, etc)	1	LS	$3,500.00	$3,500
Demolish Control Building and Foundation	1	LS	$12,000.00	$12,000
Remove Medium/High Voltage Equipment	1	LS	$3,500.00	$3,500
Remove Structural Steel Substation Frame	1	LS	$3,500.00	$3,500
Remove Copper Ground Grid	1	LS	$15,174.32	$15,174
Load Copper Wire	20,000	Feet	$0.92	$18,400
Haul Copper Wire to Recycling	6.5	Tons	$4.15	$27
Haul - Demolition Materials, Removed Equipment & Structural Steel	20	Tons	$4.15	$83
Dispose of Demolition Materials & Removed Equipment	20	Tons	$81.00	$1,620
Remove and Load Gravel Surfacing from Substation Site	5,352	Cubic Yards (BV)	$3.01	$16,110
Haul Gravel Removed from Substation Site	6,690	Cubic Yards (LV)	$14.25	$95,320
Dispose of Gravel from Substation Site (Use as Daily Cover)	8,670	Tons	$0.00	$0
Grade Substation Site	216,776	SF	$0.07	$15,174
Erosion and Sediment Control at Substation Site	975	LF	$3.86	$3,764
Decompact Substation Site (Subsoiling)	5.0	Acres	$222.97	$1,115
Permanent Seeding at Substation Site	5.0	Acres	$4,259.20	$21,296
Subtotal Substation				$291,163
Battery Energy Storage System (BESS)				
Train Crew in Safety and Hazmat	1	LS	$5,000.00	$5,000
Disconnect Battery Storage Containers	156	Each	$1,530.40	$238,742
Remove and Pack Batteries from Containers for Recycling	156	Each	$2,334.96	$364,254
Haul Batteries to Recycling Facility - Included in Recycling Fee	3,020	Tons	$0.00	$0
Recycle Li-Ion Batteries (Includes Hauling)	6,040,320	lbs	$0.30	$1,812,096
Haul Storage Containers to Metal Recycler (Becker, MN)	824	Tons	$4.15	$3,420
Remove HVAC system/Auxiliary Equipment	156	Each	$191.30	$29,843
Haul Auxiliary Equipment/Racking to Metal Recycler (Becker, MN)	1,373	Tons	$4.15	$5,698
Remove Equipment Skids	39	Each	$1,167.48	$45,532
Haul Inverters/Transformers to Transformer Disposal	39	Each	$203.68	$7,944
Remove Steel Foundation Posts (Storage Containers and Skids)	1,560	Each	$16.60	$25,896
Haul Steel Posts to Metal Recycler (Becker, MN)	112	Tons	$4.15	$465
Removal of DC Collector System Cables (copper)	6,240	LF	$2.57	$16,037
Removal of Underground AC Collector Cables (aluminum)	5,395	LF	$2.57	$13,865
Load and Haul Cables for Recycling	207	Tons	$4.77	$987
Remove and Load Gravel Surfacing from BESS Site (Including Roads)	4,707	Cubic Yard (BV)	$3.01	$14,168
Haul Gravel Removed from BESS Site	5,884	Cubic Yard (LV)	$14.25	$83,836
Dispose of Gravel from BESS Site (Use as Daily Cover)	7,626	Tons	$0.00	$0
Stabilized Construction Entrance	1	Each	$2,000.00	$2,000
Erosion and Sediment Controls at BESS Site	925	LF	$3.86	$3,571
Decompact BESS Site	4.4	Acres	$222.97	$981
Grade BESS Site	190,650	SF	$0.07	$13,346
Permanent Seeding at BESS Site	4.4	Acres	$4,259.20	$18,740
Till to Permanent Condition	4.4	Acres	$177.52	$781
Subtotal BESS				$2,707,200

O&M Building - Assumed to be off-site and not included in project decommissioning.

Site Restoration				
Stabilized Construction Entrance	13	Each	$2,000.00	$26,000
Perimeter Controls (Erosion and Sediment Control)	44,326	Linear Feet	$3.86	$171,098
Permanent Seeding on Roadway Areas (est. 50% previously not ag)	6.5	Acres	$4,259.20	$27,472
Till to Farmable Condition on Array Areas	599	Acres	$177.52	$106,317
Subtotal Site Restoration				$330,887

Project Management				
Project Manager	40	Weeks	$3,749.00	$149,960
Superintendent (full-time)	40	Weeks	$3,525.00	$141,000
Field Engineer 2x (full-time)	40	Weeks	$6,538.00	$261,520
Subtotal Project Management				$552,480
Standard industry weekly rates from RSMeans.				
Home Office and Project Management	5%			$552,646
Subtotal Demolition/Removals				$13,210,665
Salvage				
Fencing (Wire/Agricultural)	89	Tons	$248.34	$22,102
Fencing (Chain Link)	10	Tons	$248.34	$2,483
Steel Posts	3,434	Tons	$248.34	$852,800
Module Racking	7,858	Tons	$248.34	$1,951,456
PV Modules	247,198	Each	$36.51	$9,025,996
Transformers and Inverters	194,423	Pounds	$0.27	$52,494
Substation Transformers (Core and Coils)	654,323	Pounds	$0.27	$176,667
Substation Transformers (Tanks and Fittings)	220	Tons	$248.34	$54,635
Transformers (Oil)	47,700	Gallons	$0.70	$33,390
Substation Ground Grid (Copper)	13,000	Pounds	$2.73	$35,490
DC Collection Lines (Copper)	1,871,057	Pounds	$0.97	$1,814,925
AC Collection Lines (Aluminum)	564,656	Pounds	$0.74	$417,845
Subtotal Salvage				$14,440,284
Salvage values are a combination of the following factors; current market metal salvage prices, current secondary market for solar panel				
Total Demolition Minus Salvage				($1,229,700)

Notes:
1. Prices used in analysis are estimated based on research of current average costs and salvage values.
2. Prices provided are estimates and may fluctuate over the life of the project.
3. Contractor means and methods may vary and price will be affected by these.