



**Macadamia Solar**

Decommissioning Plan Report (Draft)

January 28, 2019

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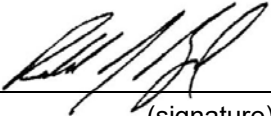


**MACADAMIA SOLAR**

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## Abbreviations

Dominion	Dominion Energy
DPR	Decommissioning Plan Report
ft	Feet
In	Inches
MWac	Megawatt Alternating Current
NC DEQ	North Carolina Department of Environmental Quality
PPE	Personal Protective Equipment
the Proponent	EDF Renewables Development, Inc.
the Project	Macadamia Solar
PV	Photovoltaic
Stantec	Stantec Consulting Services Inc.
W	Watts



# MACADAMIA SOLAR

Introduction  
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## 1.0 INTRODUCTION

### 1.1 OVERVIEW

EDF Renewables Development, Inc. (the Proponent), is proposing the development of a 484-megawatt alternating current (MWac) solar energy generating facility, known as Macadamia Solar (the Project), approximately 4.5 miles south of the town of Plymouth in Washington County, North Carolina on approximately 4,900 acres of land. The point of interconnection will be located at the Trowbridge 230 kV substation (owned by Dominion Energy [Dominion]), located approximately 4.5 miles northwest of the Project.

The Project will be located on 25 privately-owned parcels, leased by the Proponent for a period of 30 or more years. The Project is located between Route 32 (to the west) and Route 45 (to the east) and is surrounded by agricultural land uses.

The Project will include the installation of approximately 1,166,265 solar photovoltaic (PV) panels. The exact make and model of the solar panels will be determined later, but they are anticipated to be polycrystalline silicon cells with a rated power of approximately 415 watts (W) per panel.

Section 2.0 of this report describes the potential future use of the Project beyond its initial contract period. Section 3.0 describes the decommissioning activities, as well as the location and timing of any site rehabilitation and restoration for areas disturbed by the Project. It also describes the management of excess materials and waste during dismantling and decommissioning of the Project. Section 4.0 outlines details of the Emergency Response Plan, and Section 5.0 outlines notification to inform the public of Project decommissioning. Section 6.0 describes the schedule of decommissioning, and Section 7.0 outlines the cost of the decommissioning.

### 1.2 REPORT REQUIREMENTS

This Decommissioning Plan Report (DPR) describes the Project activities planned during the decommissioning phase so that potential negative environmental effects may be identified. In addition, this report describes mitigation measures in respect of negative environmental effects that could result from decommissioning activities. **Table 1.1** summarizes the requirements of this report as specified under the Washington County Solar Energy Development Ordinance.



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**Table 1.1: Decommissioning Plan Report Requirements (as per the Washington County Solar Energy Development Ordinance)**

Requirements	Section Reference
1. Initiation upon "Abandonment" of a Solar Farm	3.0
2. Any additional conditions which may be defined or established from time to time by the Washington County Planning Board upon which decommissioning will be initiated (i.e., end of lease, condition of a potential public safety hazards, etc.)	3.0
3. Complete removal of all non-utility owned equipment conduits, structures, fencing, roads and foundations; and restoration of property to condition prior to development of the Solar Farm, unless the landowner requests in writing that the access roads or other land surface areas not be restored.	3.0
4. The timeframe for completion or removal and decommissioning activities shall be from sixty (60) to one hundred eighty (180) days unless otherwise extended by Washington County within its sole discretion for good cause shown.	6.0
5. The terms and/or amounts of any proposed surety or performance bond, or certified funds which an applicant proposes to provide. Washington County requires the placement of a surety/performance bond or certified check meeting certain terms and in certain amounts as determined by the Washington County Planning Board in conjunction with the Planning Department to ensure such decommissioning or removal of hazardous materials is completed expeditiously, and at no cost to the County.	7.0



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Probable Future Use of the Facility  
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### 2.0 PROBABLE FUTURE USE OF THE FACILITY

The Project is anticipated to have an operational lifespan of 30 or more years. At the end of the Project lifespan, the Project components are expected to be decommissioned as described in Section 3.0. If Project economics and need remain viable at that time, the facility could be “repowered” with new technology and continue operating for an extended period. This process may include the replacement and/or upgrading of Project components, however specific details are unknown at this time as technological improvements over the next 30+ years are currently unknown. The Proponent would engage the public, as appropriate and as required based on regulations and requirements in effect at the time of decommissioning, prior to incorporating substantial Project changes.

Although the future land use of the Project Location cannot be known, it is most probable that after decommissioning the Project Location will be returned to its former agricultural land use. Therefore, this DPR has conservatively assumed that the future site uses will be agricultural. It should be noted that there is potential for the planned post-Project land use to change prior to actual decommissioning. The information in this Report will be updated, if required, in advance of decommissioning to represent the applicable conditions and regulatory requirements in effect at that time.



### 3.0 DECOMMISSIONING

#### 3.1 DECOMMISSIONING DURING CONSTRUCTION, ABANDONMENT, OR COMPLETION OF PROJECT

Upon the completion of the useful life of the project or if the project is deenergized for any reason for a period of time greater than 6-months, provisions of this decommissioning plan will go into effect. Likewise, in the unlikely event that construction cannot be completed and decommissioning of the Project is required during the construction phase, restoration of lands to pre-construction conditions will follow the same procedure as for the decommissioning at the end of Project life, as described in the sections below.

The Proponent would be responsible for environmental protection. In the event that the site has been cleared in preparation for installation of Project infrastructure, appropriate environmental protection measures would be implemented to prevent topsoil erosion. The extent of environmental protection measures required would be dependent on the progress made at the time of Project abandonment and would be determined through site inspections by qualified specialists.

#### 3.2 DECOMMISSIONING AFTER CEASING OPERATION

It is anticipated that the Project would have an operational lifespan of 30 or more years. The Project life could be further extended with proper maintenance, component replacement and repowering (see Section 2.0). For this section of the DPR, it is assumed that the Project will be decommissioned after the 30-year operational lifespan and prior to any substantial repowering efforts.

##### 3.2.1 General Environmental Protection During Decommissioning

During all decommissioning and restoration activities, general environmental protection and mitigation measures would be implemented. Many activities during decommissioning would be comparable to the construction phase. As such, general mitigation measures and management practices would be used, as appropriate, including erosion and sediment control, air quality and noise mitigation, and contingency plans for unexpected finds and spills.

All decommissioning and restoration activities will be performed as per the requirements of relevant governing agencies and will be in accordance with all relevant statutes in effect at the time of decommissioning.

##### 3.2.2 Pre-Dismantling Activities

At the end of the Project's useful life, it will first be de-energized and isolated from all external electrical lines. Prior to any dismantling or removal of equipment, staging areas would be delineated at appropriate locations within the Project Location, including near the project substation and inverter locations.





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Decommissioning  
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Temporary erosion and sedimentation control measures will be implemented during the decommissioning phase of the Project. These measures will be enacted with consideration of industry standard practices at the time.

### 3.2.3 Equipment Dismantling and Removal

The following sections describe the process that will be undertaken to remove the various components associated with the Project. References to original grade relate to the elevation of the site prior to construction.

#### 3.2.3.1 Solar Panels

The Project will include the installation of approximately 1,166,265 solar panels. The exact make and model of the solar panels will be determined later but are anticipated to be polycrystalline silicon cells with a rated power of 415 W per panel and measure approximately 84 inches (in) long by 42 in wide. Each solar panel will be mounted on an aluminum alloy rack system that is positioned approximately 2 to 5 feet (ft) above finished grade either at an angle between 20 and 40 degrees (fixed tilt) or with a +/- 60-degree range of motion (single axis tracking). Fixed tilt panels would be installed in rows facing south and the tracking system would be tracking east/west on a north/south axis. Each panel will be disconnected from the electrical system and unfastened from the mounting rack. After removal of the panel from the rack, it will be placed in a vehicle or container for transportation off-site for recycling or disposal.

The fixed racks that support the solar panels will be disassembled and removed from the site. The piling will be removed in their entirety where practicable but, in all case to a depth of no less than 3 ft. The metal racking components may be reused or recycled for future use.

All surface components and subsurface components, including those related to foundations, at less than approximately 3 ft in depth will be removed to at least the lesser of i) depth to bedrock, ii) 3 ft below original grade, or iii) to the depth originally installed if less than 3 ft below original grade. The soil will also be restored. Where feasible, some Project components that are located below approximately 3 ft depth such as piles or concrete footings may be completely removed from the ground.

#### 3.2.3.2 Electrical Equipment and Collector System

Inverters and inverter step-up transformer skids will be removed and shipped off site for eventual reuse or disposal. The piles and associated foundations will be removed from the site and disposed or recycled. Underground (where they are less than 3 ft below grade) and above ground collector cables will be removed.

All work to decommission the overhead / underground (where less than 3 ft below original grade) connection line would be conducted within the boundaries of the Project. The Proponent is responsible for decommissioning up to the point of interconnection, after which point the infrastructure is owned by Dominion Energy.



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### 3.2.3.3 Substation

All above ground structures and electrical equipment including main power transformer (if applicable), circuit breakers, chain link fencing, and control building(s) and would be removed. Material used to build up the area above original grade, including any gravel and fill, will be removed to restore the land to original grade. Any concrete foundations would be removed to at least 3 ft below original grade or to the depth originally installed if less than 3 ft below original grade. All granular and geotextile materials would be removed from the Project Location by a dump truck or placed in a designated on-site area for use by the landowner. All electrical system components will be taken off-site for reuse or disposal.

### 3.2.3.4 Access Roads

All access roads will be removed; this includes any geotextile material beneath the roads and granular material. All granular and geotextile materials would be removed from the site by dump truck.

Where any access roads will be removed within areas that were previously used for agricultural purposes, topsoil will be redistributed to provide substantially similar ground cover as was present within the areas prior to site disturbance. The exception to removal of the access roads and associated culverts or their related material would be upon written request from the landowner to leave all or a portion of these facilities in place for future use by the landowner.

### 3.2.3.5 Storage Infrastructure and Perimeter Fence

Storage and operation infrastructure and any associated temporary decommissioning improvements (e.g., temporary construction trailer) used during the decommissioning phase will be removed from the site by truck. Any foundations associated with these facilities would be removed to a depth of at least 3 ft below original grade or to the depth originally installed if less than 3 ft below original grade.

Perimeter fencing would be removed and recycled or re-used. Where the landowner prefers to retain the fencing, these portions of fence would be left in place.

## 3.3 SITE REHABILITATION/RESTORATION

The operator of the Project at the time of decommissioning will develop a Rehabilitation Plan designed to restore agricultural lands and wildlife habitat in areas affected by the Project.

The Rehabilitation Plan should include, but not be limited to the following:

- agricultural areas, which comprise the majority of the pre-developed Project Location, will be restored by redistributing topsoil to provide substantially similar ground cover as was present within the areas prior to site disturbance to accommodate the return of active agricultural operation of the site.
- access roads and other areas which may have become compacted during operation or decommissioning will be decompact to pre-existing conditions.



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- restoration of any drainage tile that was impacted by the Project and existing within the Project Location at the initiation of Project construction to the same condition or better condition than it was prior to Project construction.

Where Project infrastructure has been removed, disturbed areas will be immediately returned to agricultural and silvicultural uses. Erosion and sediment control measures will be installed at ditches and will be left in place until ground cover is fully established.

### 3.3.1 Water Quality

Any proposed decommissioning works within or near streams or waterbodies would be discussed with Washington County to determine any applicable guidelines, permitting, site-specific mitigation and/or remediation plans. Similar mitigation and monitoring measures implemented during construction will be used during decommissioning of the Project. Measures are anticipated to include standard construction practices at the time of decommissioning including erosion and sediment control during removal of the structures.

### 3.3.2 Agricultural Lands

Agricultural lands that have become compacted due to facility operation or decommissioning activities, such as access roads, would be decompacted using chisel ploughing and/or subsoiling, ripping or disking as determined by an environmental advisor or landowner.

In the event that the site is intended to return to agricultural production, any agricultural tile drains capped or modified during construction, and/or damaged during construction, operation and/or decommissioning, would be repaired or replaced by a drainage tile contractor of the landowner's choosing and returned to the same condition or better condition than it was prior to Project construction.

### 3.3.3 Spills

Although strict spill prevention and spill response procedures will be in place during operation, there is the potential for small spills to occur during routine operation, maintenance, and decommissioning. Hazardous materials or wastes will not be stored on-site during operation and maintenance of the Project. Provided the Project is operated and maintained in accordance with industry best practices there should be no significant environmental liabilities associated with cleanup or remediation.

## 3.4 MANAGING EXCESS MATERIALS AND WASTE

Typical waste materials and modes of disposal, recycling or reuse are presented in **Table 3.1**.



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**Table 3.1: Typical Facility Decommissioning Waste Materials and Modes of Disposal**

<b>Component</b>	<b>Typical Mode of Disposal</b>
Concrete foundations	Crush and recycle as granular material
Solar Panels	Reuse or recycle
Steel and aluminum racks and mounts	Salvage for reuse or recycle for scrap
Cabling	Recycle
Inverter step-up transformers, inverters, and circuit breakers	Salvage for reuse or recycle for scrap
Granular material	Reuse or dispose in landfill
Oils/lubricants	Recycle
Hazardous materials	Dispose through licensed hauler
Geotextile material	Dispose in landfill
Miscellaneous non-recyclable materials	Dispose in landfill

Major pieces of equipment may be recyclable or reusable. The galvanized-steel and/or aluminum racks may be sold for scrap or recycled. Electrical equipment could either be salvaged for reuse or recycled. Components such as the cabling would have a high resale value due to copper and aluminum content. Concrete from footings could be crushed and recycled as granular fill material. Spent oils if any could be recovered for recycling through existing oil reprocessing companies.

As much of the facility would consist of reusable or recyclable materials, there would be minimal residual waste for disposal as a result of decommissioning the facility. Small amounts of registerable waste materials would be managed in accordance with the North Carolina Department of Environmental Quality (NC DEQ) Hazardous Waste Section regulations. Residual non-hazardous wastes would be disposed of at a licensed landfill in operation at the time of decommissioning.



## 4.0 EMERGENCY RESPONSE AND COMMUNICATIONS PLANS

The following programs, plans, and procedures will be carried forward during the decommissioning of the Project.

### 4.1 ENVIRONMENTAL PROCEDURES

- *Spills and releases:* identify the procedures for the prevention, response, and notification of spills. In addition, establish the general procedures for spill clean-up, personnel training, and material handling and storage to prevent spills.
- *Hazardous waste management:* to outline the procedures for proper identification, storage, handling, transport, and disposal of hazardous waste. In addition, the procedures will outline requirements for personnel training, emergency response, product review and approval, and record keeping.
- *Non-hazardous waste management:* establish alternative procedures for the management and disposal of used lubricants, used drums, and general waste.

### 4.2 OCCUPATIONAL HEALTH AND SAFETY PROCEDURES

The general contractor retained to undertake decommissioning will be responsible for employee health and safety and will implement the following safety procedures and protocols, as appropriate, to maintain employee safety throughout decommissioning activities:

- Personal protective equipment (PPE), including non-slip footwear, eye protection, clothing, and hardhats, will be worn by personnel when on duty
- Elevated platforms, walkways, and ladders will be equipped with handrails, toeboards, and non-slip surfaces
- Electrical equipment will be insulated and grounded in compliance with the appropriate electrical code.

As appropriate, the general contractor retained to undertake decommissioning will develop or have an existing training program that can be implemented to appropriately train personnel on decommissioning programs, environmental, health, and safety procedures, and the Emergency Response Plan.

### 4.3 HEALTH AND SAFETY PLAN

The general contractor will prepare a Health and Safety Plan considering both public and occupational health and safety issues. This may include protecting the public from equipment and construction areas by posting warning signs, use of PPE, accident reporting, and equipment operation.



#### **4.4 EMERGENCY RESPONSE AND COMMUNICATIONS PLAN**

The Emergency Response and Communications Plan will be utilized during the decommissioning of the Project, along with the Complaint Response Protocol. This includes informing the public and Washington County about activities occurring at the Project site (including emergencies), means for contacting the Proponent or the general contractor responsible for decommissioning, recording follow up on complaints expressed during the decommissioning phase, and reporting spills to the NC DEQ, as required.



## MACADAMIA SOLAR

Decommissioning Notification  
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### 5.0 DECOMMISSIONING NOTIFICATION

Advance notification of decommissioning will be provided to Washington County prior to decommissioning work commencing. Notification may be in the form of letters, newspaper notices, and updates on the Project or Proponent website or direct communications.



## MACADAMIA SOLAR

Decommissioning Schedule  
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### 6.0 DECOMMISSIONING SCHEDULE

As per Washington County, the timeframe for completion or removal and decommissioning activities will be from sixty (60) to one hundred eighty (180) days unless otherwise extended by Washington County within its sole discretion for good cause shown.





## MACADAMIA SOLAR

Decommissioning Costs

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### 7.0 DECOMMISSIONING COSTS

Prior to the issuance of a Zoning Permit, Washington County requires that the Proponent provide the County with a performance guarantee in the form of a surety/performance bond or certified check. This guarantee must remain in effect until the solar farm is decommissioned and all site restoration is completed. In consideration of the size of the Project, Macadamia Solar would consider posting a \$100,000 surety bond at year 1. Then at year 10 of the project, Macadamia Solar will increase the bond to \$150,000 through year 15. From year 15 to year 20, the bond increases to \$200,000, and from year 20 on, the bond will remain at \$250,000. The nature of solar development and its financial agreements with power purchasers means that there is virtually no risk of non-generation for the first half of its initial life and very minimal risk thereafter. Thus, the step-up of decommissioning surety properly follows the maturity of the site but doesn't cause undue financial stress to the initial development of the Project. A summary of the demolition cost opinion is provided in the Table 7.1 and the estimate of salvage value through recycling is included in Table 7.2.

**Table 7.1: Demolition Cost**

Item No.	Item	Unit	Estimated Quantity	Unit Price	Total Cost
1	Fence Removal	lf	277,200	\$13.00	\$3,603,600
2	Road Removal	cy	9,800	\$25.00	\$245,000
3	Racking Frames	ea	16,200	\$500.00	\$8,100,000
4	Racking Posts	ea	64,800	\$6.50	\$421,200
5	Solar Panels	ea	1,166,265	\$4.00	\$4,665,060
6	Inverters	ea	194	\$1,500.00	\$291,000
7	Transformers	ea	194	\$1,200.00	\$232,800
8	Main Transformer	ea	1	\$2,400.00	\$2,400
9	Wire (Copper)	lb	271,520	\$0.50	\$135,760
10	Wire (Aluminum)	lb	488,350	\$0.50	\$244,175
11	Light Grading	ac	1000	\$500.00	\$500,000
12	Hydroseeding	ac	1000	\$2,500.00	\$2,500,000
<b>Total</b>					<b>\$20,940,995</b>



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Decommissioning Costs  
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**Table 7.2: Salvage Value**

Item No.	Item	Unit	Quantity	Weight	Estimated Quantity	Unit Price	Total Cost
1	Fence	lb		1,330,560	1,330,560	\$0.15	\$199,584
3	Racking Frames	ea	16,200	1,224	19,828,800	\$0.87	\$17,251,056
4	Racking Posts	ea	64,800	60	3,888,000	\$0.16	\$622,080
5	Solar Panels	ea	1,166,265		1,166,265	\$14.00	\$16,327,710
6	Inverters	ea	194		194	\$2,500.00	\$485,000
7	Transformers	ea	194		194	\$2,000.00	\$388,000
8	Main Transformer	ea	1		1	\$4,000.00	\$4,000
9	Wire (Copper)	lb		271,520	271,520	\$0.85	\$230,792
10	Wire (Aluminum)	lb		488,350	488,350	\$0.87	\$424,865
<b>Total</b>							\$35,933,087

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