Painted Desert Solar Project
Final Decommissioning Plan

OCTOBER 2024

PREPARED FOR

Painted Desert Solar, LLC

PREPARED BY

SWCA Environmental Consultants

PAINTED DESERT SOLAR PROJECT
FINAL DECOMMISSIONING PLAN

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SWCA Project No. 71537-006

October 2024

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ACRONYMS AND ABBREVIATIONS

BESS	battery energy storage system
BMP	best management practice
LGP	low ground pressure
m	meter(s)
MW	megawatt

1 INTRODUCTION

Painted Desert Solar, LLC (Painted Desert), proposes to construct the Painted Desert Power (project) in Coconino County, Arizona. The project consists of an up to 750-megawatt (MW), alternating current utility-scale solar energy system, an up to 375-MW (4-megawatt-hour storage energy capacity) battery energy storage system (BESS), a 4.2-mile generation-tie line, and ancillary facilities. Project components include solar panels mounted on trackers arranged in multiple arrays, transformers, direct current to alternating current inverters, a collection system that connects the arrays to a BESS, a substation, an operations and maintenance building, and a switchyard. The solar facility project would be located on approximately 4,500 acres of Navajo Nation Land in Coconino County, Arizona, just east of Cameron, Arizona (project area) (Figure 1). Painted Desert is submitting this decommissioning and reclamation plan for the project in accordance with the 2021 IFC Chapter 12 Energy Systems and requirements set forth in the lease and real estate agreements with the Navajo Nation.

1.1 Triggering Events and Expected Lifetime of Project

Project decommissioning may be initiated by specific events such as the termination of the power purchase agreement or the completion of the project's operational life cycle.

The anticipated lifespan of a utility-scale solar facility, if properly maintained, typically ranges from 25 to 35 years. However, with strategic equipment replacement and repowering, the project lifespan can be extended to 50 years or more. Flexibility exists for retrofitting the solar arrays with updated components, such as panels, frames, and tracking systems, to prolong the project's viability. In instances where retrofitting is not pursued or upon reaching the end of the project's useful life, decommissioning entails the removal of panels and associated components from the project site.

The value of individual components within the solar facility fluctuates over time. Generally, the highest component value is realized during the construction phase, gradually declining over the project's lifecycle. Throughout most of the project's duration, components (e.g., solar panels) can be resold in the wholesale market for reuse or refurbishment. As panels age or endure weathering, their efficiency and power production decrease, resulting in a corresponding decline in resale value. Secondary markets for used solar components cater to other utility-scale solar facilities, with similar designs requiring replacement equipment due to damage or wear over time, as well as to other buyers—such as developers and consumers—seeking a cost-effective option with a slightly reduced power output compared to new equipment.

Components of the solar facility retaining their resale value may be marketed in the wholesale market, while those lacking resale value will undergo salvage for recycling or disposal at an approved off-site licensed solid waste disposal facility (i.e., landfill). Decommissioning activities will include removing the arrays and associated components (see Section 2).

Figure 1. Project overview map

1.2 Decommissioning Sequence

Decommissioning and reclamation will commence according to the timelines specified in this plan. It is estimated that the decommissioning activities and reclamation activities would take approximately 12 months to complete per phase. Painted Desert assumes responsibility for these tasks. Continuous monitoring and site restoration efforts may extend beyond this period to ensure the successful revegetation and rehabilitation of the project area. Although there may be an overlap of activities, the anticipated sequence of decommissioning and removal is outlined below for each phase[1]:

1. Assess and reinforce access roads, if necessary, and prepare the site for component removal.
2. Implement erosion control measures, including the installation of fencing and other best management practices (BMPs), to safeguard sensitive resources and mitigate erosion during decommissioning activities.
    a. This includes the dust suppression BMPs, i.e. application of water to roadways, limited vehicle speeds, and stopping work during high wind events.
3. De-energize the solar arrays.
4. Dismantle panels and racking.
5. Remove frames and internal components.
6. Excavate portions of structural foundations to a depth of at least 3 feet (36 inches) below the surface, and backfill the site as necessary.
7. Remove inverter stations and associated foundations.
8. Extract electrical cables and conduits to a depth of at least 3 feet (36 inches) below the surface.
9. Remove BESS equipment and associated foundations.
10. Demolish access and internal roads and grade the site as required.
11. Disassemble the substation.
12. Eliminate overhead transmission lines and poles.
13. Transport of material for proper disposal or recycling.
14. De-compact subsoils as needed, and restore and revegetate disturbed land to preconstruction conditions to the extent feasible; and as required under plans and agreements with the Lessor.

It is important to note that while the outlined sequence provides a structured approach, flexibility is maintained to accommodate any variations in the decommissioning process and to ensure effective execution.

2 DECOMISSIONING/RECLAMATION

This section outlines the solar facility components and decommissioning activities required to restore the project area, as closely as practicable, to its preconstruction conditions.

[1] Note decommissioning would also be phased, therefore Phase I would be decommissioned prior to take, Phase II offline, and so on.

2.1 Overview of Solar Facility System

Painted Desert anticipates using approximately 1,682,480 solar modules after completion of all three phases, with a total nameplate generating capacity of approximately 750 MW (250 MW per phase). The project area encompasses approximately 4,500 acres. The generating facilities will be bounded by perimeter fencing as shown on Figure 2 (preliminary design; subject to modification). The land within the perimeter fencing is predominantly desert. Statistics and estimates provided in this plan are based on a Jinko Solar JKM580N-72HL4-BDV module, although the final panel manufacturer has not been selected at the time of the writing of this report.

Collection cabling will be installed below the surface at a depth of approximately 3 feet (36 inches). Foundations, steel piles, and electric cabling and conduit that are less than 3 feet (36 inches) below the soil surface will be removed. Components and cabling deeper than 3 feet (36 inches) below the surface may be abandoned in place upon agreement with the landowner. Access roads may be left in place if requested and/or agreed to by the landowner in writing; however, for purposes of this assessment, it is assumed that all access roads will be removed. Public roads damaged or modified during the decommissioning and reclamation process will be repaired upon completion of the decommissioning phase. The estimated cost of repairing the public road is included in Section 4.1.

Estimated quantities of materials to be removed and salvaged or disposed of are included in this section and in Table 1. Many of the materials described have salvage value; although, some components will likely have no value at the time of decommissioning. Removed materials will be salvaged or recycled to the extent possible. Other waste materials will be disposed of in accordance with state and federal law in an approved licensed solid waste facility. Solar panels may have value in a resale market, depending on their condition at the end of the project's life. If the project is decommissioned prior to the anticipated 25 to 30–year timeframe, the resale value of components may be substantially higher than at the end of the projected project. Table 1 presents a summary of the primary components of the project included in this decommissioning plan.

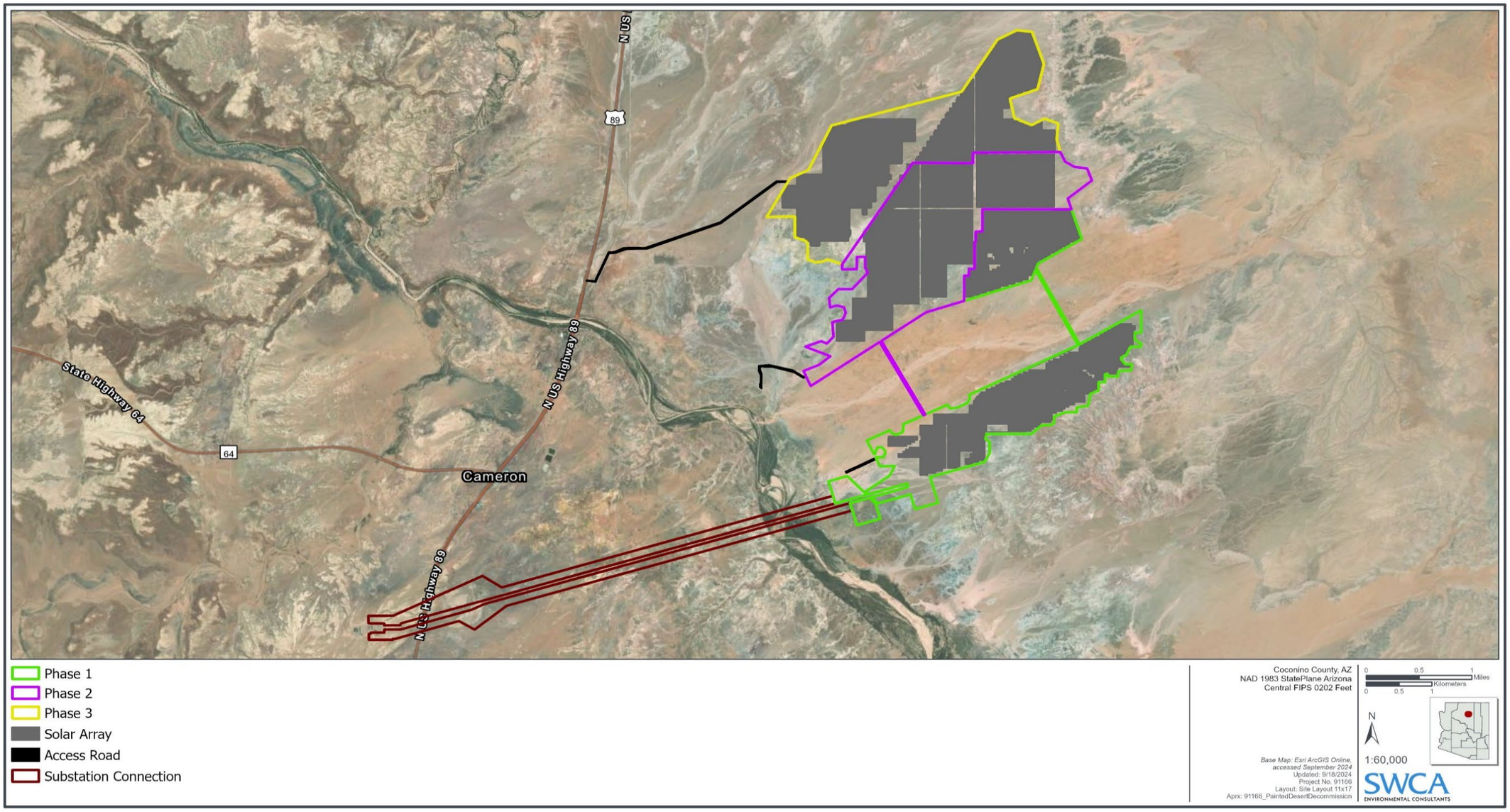

Figure 2. Site layout.

Table 1. Primary Installed Facility Components

Component	Phase 1	Phase 2	Phase 3	Total Quantity	Unit of Measure
Solar Array					
Solar modules (approximation)	552,906	566,757	562,615	1,682,278	Each
Tracking system (27 module)	565	166	210	941	Each
Tracking system (54 module)	4,081	4,144	4,277	12,502	Each
Tracking system (81 module)	3,917	4,179	4,027	12,123	Each
Steel piles	83,042	84,296	83,800	251,138	Each
Inverters	61	62	62	185	Each
Electrical cables (buried) and conduit	151,000	155,240	208,156	514,396	Linear feet
Electrical cables (overhead) and conduit	9,600	48,000	800	58,400	Linear feet
Perimeter fencing	67,900	35,200	41,800	144,900	Linear feet
Fence posts	6,790	3,520	4,180	14,490	Each
Access road	82,500	72,300	58,500	213,300	Linear feet
Substation		1		1	Each
O&M Building w/ Parking (2.5 acres)		1		1	Each
Septic System		1		1	Each
5,000 Gallon Potable Water Tank		1		1	Each
Generation-Tie Line					
Transmissions poles		26		26	Each
Length of transmission cable		27,456		27,456	Linear feet
BESS					
40-foot battery container	0	136	136	272	Each
Battery module (Samsung SDI-E5S)	0	52,224	52,224	104,448	Each
Battery racks	0	6,528	6,528	13,056	Each
Inverters (MsWD3-V730)	0	68	68	136	Each

2.2 Solar Modules

Painted Desert Power is deliberating the adoption of a mono bifacial half-cell panel (580 watts) from Jinko Solar or a comparable module from other manufacturers for the project. Each module assembly (including frame) weighs approximately 32 kilograms (70.6 pounds) and measures about 2.3 × 1.1 meters (m) (7.5 × 3.6 feet). Each module assembly is mainly made up of nonmetallic materials such as silicon, glass, composite film, plastic, and epoxies, with an anodized aluminum alloy frame; these modules comprise the solar array.

At the time of decommissioning, modules that are operational may undergo refurbishment and be sold in the secondary market, yielding a higher revenue compared to selling them as salvage material.

Nonfunctional modules will be shipped to either the manufacturer or a third party for recycling or disposal.

2.3 Tracking System and Support

The solar modules will be affixed to a single-axis tracking system, such as the NX Horizon manufactured by Nextracker, or an equivalent system. Each tracker measures approximately 85 m (283 feet) in length and will support 90 solar modules per tracker. Composed mainly of high-strength galvanized steel and anodized aluminum, with steel piles supporting the system, the tracking system will be deactivated and disassembled during decommissioning.

Salvageable materials from the supports, tracking system, and posts can be sold to generate revenue, thereby offsetting the decommissioning costs.

Non-salvageable materials will be sent to a metal recycling facility.

2.4 Inverter Stations

The combined inverters/transformers (inverter stations) will be situated on small concrete footings or piers supported by steel piles within the array. These stations will be deactivated, disassembled, and removed. It is assumed for this report that piers with steel piles will be employed. Depending on their condition, the equipment may be refurbished for reuse or salvaged. If not repurposed, they will be disposed of at an approved waste management facility.

2.5 Electrical Cabling and Conduits

The project's underground electrical collection system will be buried approximately 3 feet (36 inches) below the ground surface. Cabling at or above 3 feet (36 inches) will be salvaged, while deeper cables may be abandoned in place. No recovery cost has been assumed for the collection cabling, although it is likely to have a salvage value at the time of removal.

Sections of the project collection system will be overhead, consisting of direct embedded, guyed, wood poles carrying multiple circuits. These wood structures are approximately 60 ft tall, with approximately 17 structures per alignment, and 8 alignments for the ultimate buildout.

2.6 Project Substation

The project substation will be constructed in phases. Ultimately, all three phases will encompass an area approximately 152 × 200–m (500 × 655foot) footprint, and will house a gravel pad, power transformers and footings, and electrical control house with concrete foundations. The substation perimeter will be fenced. Salvageable components of the substation, such as the transformer, may be sold for reuse. Unsalvageable parts will be transported off-site for disposal.

Painted Desert will also install an Operation and Maintenance (O&M) building for onsite operations. This structure will contain recyclable materials particularly various metals, which will be included in the salvage efforts. Non-salvageable materials will be disposed of properly disposed of along with other construction waste. Additionally, there will be up to 2.5 acres of parking.

2.7 Potable Water and Septic System

To support the onsite facilities Painted Desert will install a 5,000-gallon capacity potable water tank, this tank will be filled by trucking as needed. The tank will be installed behind the O&M building. Additionally, a septic system will be installed that will drain into a septic leach field to the south of the gravel pad supporting the O&M building and BESS system. During Decommissioning the water tank will

be removed and sold and the septic system will be removed and the impacted ground will be regraded and restored to pre-construction conditions

2.8 Battery Energy Storage System

Painted Desert will be installing 375 MW of battery storage as part of the overall site development. The BESS will be installed within a 396 × 305–m (1,300 × 1,000–foot) area (29.8 acres) on the southern edge of the project adjacent to the project substation. This footprint will house the 272 40-foot Conex containers, inverters, and support infrastructure. The batteries planned for this will be Samsung SDI/E5S or equivalent. Salvageable materials from the Conex containers, inverters, and battery racks can be sold to generate revenue, thereby offsetting the decommissioning costs.

Non-salvageable materials will be sent to a metal recycling facility.

2.8 Transmission Line

Painted Desert will construct an approximately 4.2-mile, 525kV (kilovolt) transmission line to connect the project substation to a point of interconnection substation. The line will be strung on 4, 90-foot to 140-foot H-frame structures, which consist of two steel poles per structure, and 22, 125-foot to 170-foot steel monopoles. Each leg of the H-frame steel poles would have foundations with depths of approximately 22 to 43-feett-deep. Each of the steel monopoles would have approximately 19 to 34-foot-deep foundations.

Salvageable materials from the poles and cable can be sold to generate revenue, thereby offsetting the decommissioning costs. Non-salvageable materials will be sent to a metal recycling facility.

2.9 Perimeter Fencing and Access Roads

The Painted Desert site will include a security fence around the perimeter of the site and exclusionary area. The fence will total approximately 27 miles in length. Access drives will provide direct access to the solar facility from local roads and along the inner perimeter of the arrays. Internal roads will be located within the array to allow access to the equipment. The site access drives will be approximately 20 feet wide and approximately 40 miles long. The access road lengths may change in the final Project design. To be conservative, the decommissioning estimate assumes that all access roads will be completely removed.

Unless the landowner states in writing that certain elements are to be retained, all fence parts and associated foundations, gravel pads, and access roads will be removed.

During installation of the project access roads, subgrade conditions may be stabilized by incorporating cement into soft ground. This plan assumes the cement materials will be incorporated into the top 10 inches of existing soil, which will then be capped with 2 inches of granular fill.

Decommissioning activities include removing and stockpiling aggregate materials on-site for salvage preparation. It is conservatively assumed that all cement-stabilized soil and aggregate materials will be removed from the project site and transported up to 10 miles from the project area. Following removal of the aggregate and cement-stabilized soil, the access road areas will be graded; loosened with a deep ripper or chisel plow (ripped to 18 inches); backfilled with native subsoil and topsoil, as needed; and graded as necessary.

3 LAND USE AND ENVIRONMENT

All hazardous materials will be disposed of in a manner consistent with federal, state, and local laws.

Soil shall be tested once energy production has ceased but before any equipment is removed. At least five samples will be taken, and they shall be representative of the overall project area; outliers in terms of soil type, drainage, or plant growth shall be excluded. The samples from before and after the operation of the facility will be compared to determine what contaminants, if any, are present and to develop a remediation program if necessary.

3.1 Soils and Desert

The desert habitat within the project will be generally restored to its preconstruction condition, aligning with landowner lease agreements. Restoration efforts will be guided by consultations with current landowners and compliance with applicable regulations at the time of decommissioning. Disturbed land will be restored to its preconstruction state. Any soil exposed during decommissioning will be stabilized in accordance with Arizona Department of Transportation erosion control and stormwater quality standards. The Project will also implement a Dust Suppression Plan, this includes BMPS for the application of water to roadways, limited vehicle speed, and stopping during high wind events.

3.2 Restoration and Revegetation

Excavated and backfilled project sites will undergo grading as previously detailed. Any voids or holes remaining after equipment removal will be filled. Soil compaction resulting from deconstruction activities will be rectified as needed to restore land to its preconstruction state. Damaged drain tiles, if present, will be restored to preconstruction condition. Disturbed areas will be enriched with topsoil and seeded with appropriate vegetation, in coordination with landowners. All work will adhere to conditions agreed upon by the Navajo Nation, or as dictated by prevailing regulations at the time of decommissioning.

During decommissioning, disturbances or removal of additional native vegetation shall be avoided to the greatest extent practicable. Any land disturbed during the decommissioning process will be revegetated or reseeded with native plants according to such plans or agreements with the Navajo Nation, or with other species that provide ecological services. Revegetation will be completed within 1 year of the removal of equipment, with a 6-month extension available, if needed, to complete one growing season.

3.3 Surface Water Drainage and Control

Predominantly situated within rangeland, the proposed project area features relatively flat terrain. The project layout has been designed to circumvent wetlands, waterways, and drainage ditches to the greatest extent feasible. Project site conditions and proposed BMPs for safeguarding surface water features will be delineated in a project Stormwater Pollution Prevention Plan before construction begins.

Surface water conditions will undergo reassessment before decommissioning. Additionally, construction stormwater permits will be obtained, and a Stormwater Pollution Prevention Plan will be developed to account for prevalent conditions at the decommissioning stage. BMPs may encompass construction entrances, temporary and permanent seeding, mulching (in non-agricultural areas), erosion control matting, silt fence, filter berms, and filter socks.

3.4 Major Equipment Required for Decommissioning

Decommissioning activities involve the removal of aboveground project components and subsequent restoration (see Sections 2 and 3.2).

Equipment needed for decommissioning the solar facility may include, but is not limited to, the following: small cranes, low ground pressure (LGP) track-mounted excavators, backhoes, LGP track bulldozers, LGP off-road end-dump trucks, front-end loaders, deep rippers, water trucks, disc plows, tractors for subgrade restoration, and ancillary equipment. Over-the-road dump trucks will facilitate material transport from the site to disposal facilities.

4 DECOMMISSIONING COST ESTIMATE SUMMARY

Expenses associated with decommissioning the project will be dependent on labor costs at the time of decommissioning. For this report, 2023 to 2024 average market value approximations were used to estimate labor expenses. Fluctuation and inflation of the labor costs were not factored into the estimates.

4.1 Decommissioning Expenses

Project decommissioning will incur costs associated with disposal of components not sold for salvage, including materials which will be disposed of at a licensed facility, as required. Decommissioning costs also include backfilling, grading, and restoration of the proposed project site as described in Section 2. Table 2 provides a summary of the estimated costs for the decommissioning activities associated with the major components of the project.

Table 2. Estimated Decommissioning Expenses

Activity	Unit	Phase 1	Phase 2	Phase 3	Total Quantity	Cost Per Unit	Total
Management oversight and permitting	Lump sum				1	$250,000.00	$250,000.00
Mobilization/Demobilization	Lump sum				2	$500,000.00	$1,000,000.00
Solar modules: disassembly and removal	Each	552,906	566,757	562,815	1,682,478	$4.88	$8,210,492.64
Tracker system (27 module): disassembly and removal	Each	565	166	210	941	$443.00	$416,863.00
Tracker system (54 module): disassembly and removal	Each	4081	4144	4277	12,502	$575.00	$7,188,650.00
Tracker system (81 module): disassembly and removal	Each	3917	4179	4027	12,123	$663.00	$8,037,549.00
Steel pile removal	Each	83,042	84,296	83,800	251,138	$10.29	$2,584,210.02
Inverter station removal	Each	61	62	62	185	$1,700.00	$314,500.00
Removal of O&M Building	Each		1 (2.5 Acres)			$15,000	$15,000.00
Access roads and inverter foundation removal	Lump sum		1		1	$400,000.00	$400,000.00
Perimeter fence removal	Linear feet	67,900	35,200	41,800	144,900	$2.97	$430,353.00
Fence Posts	Each	6,790	3,520	4,180	14,490	$10.29	$149,102.10

Activity	Unit	Phase 1	Phase 2	Phase 3	Total Quantity	Cost Per Unit	Total
Electrical cables (overhead) and conduit	Linear feet	9,600	48,000	800	58,400	$0.25	$14,600
Electrical cables (buried) and conduit	Linear feet	151,000	155,240	208,156	514,396	$3.50	$1,800,386.00
Removal of transmission poles (9-foot foundation), including cables	Lump sum		1		1	$483,000.00	$483,000.00
Battery container removal	Each	0	136	136	272	$7,500.00	$2,040,000.00
Battery Modules removal/disposal	Each	0	52,224	52,224	104,448	$12.40	$1,295,155.20
Battery rack removal	Each	0	6,528	6,528	13,056	$478.00	$6,240,768.00
BESS inverter pad removal	Each	0	68	68	136	$1,700.00	$231,200.00
Site restoration (4,500 acres)	Lump sum		1		1	$450,000.00	$450,000.00
Project substation removal	Each		1		1	$350,000.00	$350,000.00
Removal of Septic System	Each		1		1	7,500.00	$7,500.00
Removal of Potable Water Tank	Each		1		1	$2,000.00	$2,000.00
Repair of public roads	Lump sum		1		1	$75,000.00	$75,000.00
Trucking/Disposal fees	Lump sum		1		1	$350,000.00	$350,000.00
Total							**$42,336,328.96**

4.2 Decommissioning Revenues

Project revenue will be realized through the sale of the solar facility components and construction materials. Modules and other components may be sold within a secondary market or as salvage. The market value of steel and other materials fluctuates daily and has varied widely over the past 5 years. Salvage value estimates were based on the approximate 5-year average price of steel and copper derived from sources including online recycling companies and U.S. Geological Survey commodity summaries. The price used to value the steel used in this report is $253 per metric ton; aluminum is $0.40 per pound; silicon is $0.40 per pound; and glass is $0.05 per pound. The main component used in the tracking system and present in the piles is assumed to be salvageable steel. Solar panels are estimated to contain approximately 75% glass, 8% aluminum, and 5% silicon. A 70% recovery rate is assumed for aluminum and all panel components, due to the processing required to separate the panel components. Alternative and more efficient methods of recycling solar panels are anticipated before this project is decommissioned, given the large number of solar facilities that are currently being developed. Table 3 summarizes the potential salvage value for the solar array components and construction materials at end of life.

Table 3. Estimated Decommissioning Revenues

Item	Unit	Salvage Price Per Unit	Units Per Item	Total Salvage Price Per Item	Number of Units	Total
Panels - silicon	Average number of pounds per panel (item)	$0.40	1.7	$0.68	1,682,278	$1,143,949.04
Panels - aluminum	Average number of pounds per panel (item)	$0.40	2.8	$1.12	1,682,278	$1,884,151.36
Panels - glass	Average number of pounds per panel (item)	$0.05	26.1	$1.31	1,682,278	$2,203,784.18
Panels - other	Average number of pounds per panel (item)	$0.50	2.4	$1.20	1,682,278	$2,018,733.60
Tracking system, transmission poles, and posts (mixed metals)	Tons	$215	1	$215	500	$107,500.00
Cables	Tons	$3,000	1	$3,000	100	$300,000.00
Inverters	Each	$80	1	$80	321	$25,680.00
Substation/BESS Containers/O&M Building metal	Lump sum	–	–	$500,000	1	$500,000.00
Total						**$8,183,798.18**

4.3 Decommissioning Cost Summary and Financial Assurance

A summary of the net estimated cost to decommission the project, using the information detailed in Sections 4.1 and 4.2, is provided in Table 4. Estimates are based on 2023 to 2024 prices; market fluctuations and inflation were not included in the estimate.

Table 4. Net Decommissioning Summary

Item	Total
Decommissioning expense	$42,336,328.96
Potential revenue – salvage value of panel components and recoverable materials	$8,183,798.18
Net Decommissioning Cost	**$34,152,530.78**