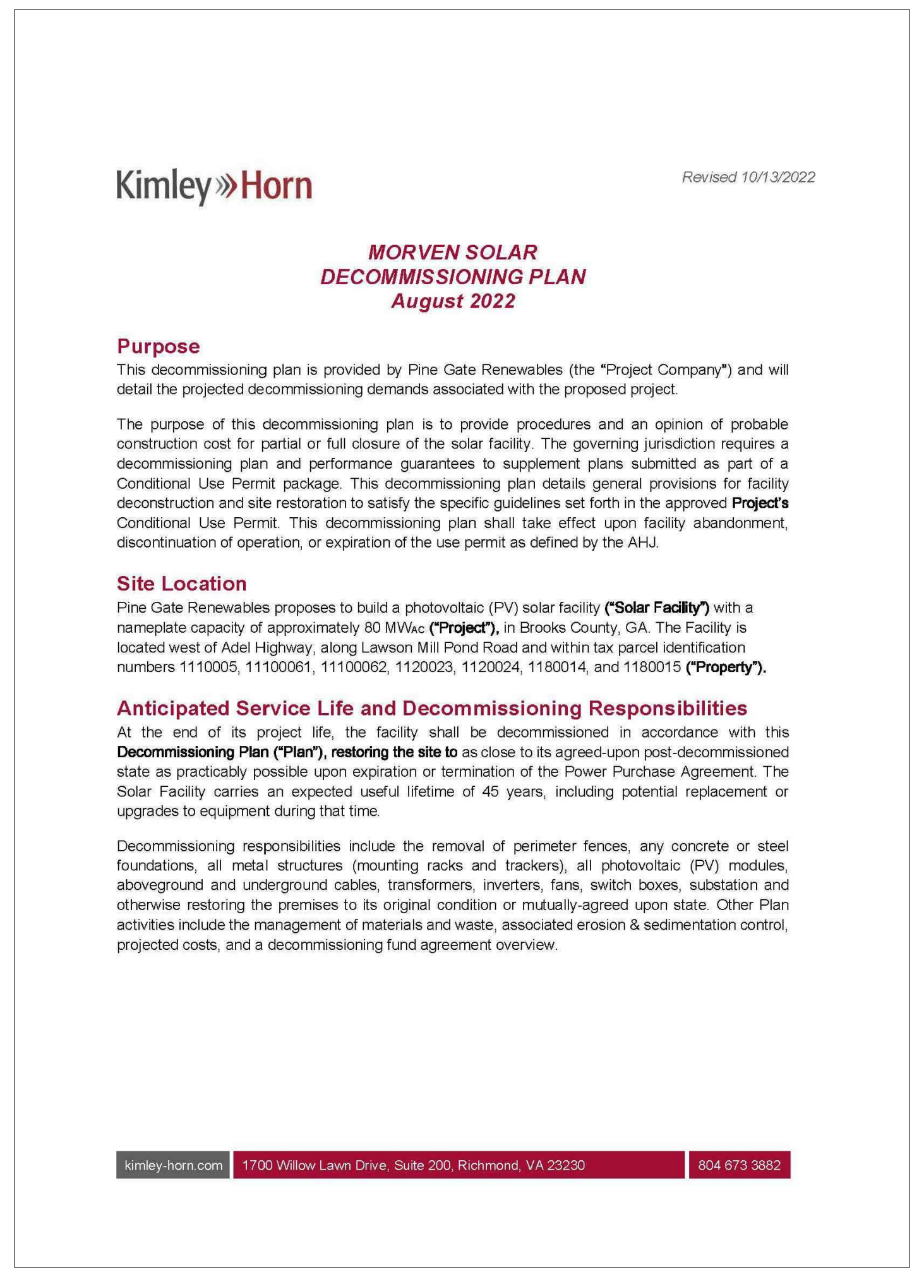
PINEGATE
RENEWABLES

130 ROBERTS STREET
ASHEVILLE, NC 28801



# *MORVEN SOLAR*
# *DECOMMISSIONING PLAN*
*August 2022*

## Purpose

This decommissioning plan is provided by Pine Gate Renewables (the "Project Company") and will detail the projected decommissioning demands associated with the proposed project.

The purpose of this decommissioning plan is to provide procedures and an opinion of probable construction cost for partial or full closure of the solar facility. The governing jurisdiction requires a decommissioning plan and performance guarantees to supplement plans submitted as part of a Conditional Use Permit package. This decommissioning plan details general provisions for facility deconstruction and site restoration to satisfy the specific guidelines set forth in the approved **Project's** Conditional Use Permit. This decommissioning plan shall take effect upon facility abandonment, discontinuation of operation, or expiration of the use permit as defined by the AHJ.

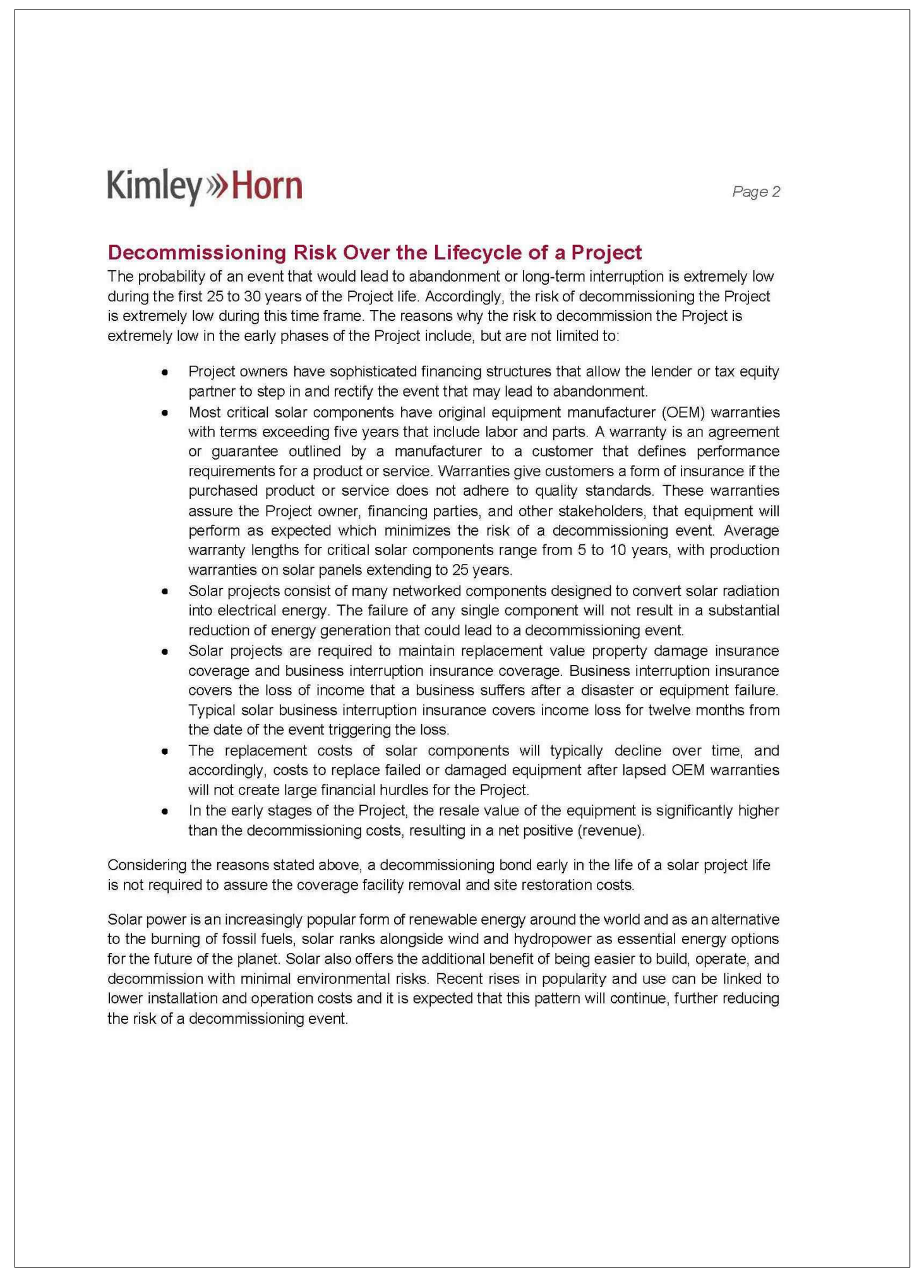
## Site Location

Pine Gate Renewables proposes to build a photovoltaic (PV) solar facility **("Solar Facility")** with a nameplate capacity of approximately 80 $MW_{AC}$ **("Project"),** in Brooks County, GA. The Facility is located west of Adel Highway, along Lawson Mill Pond Road and within tax parcel identification numbers 1110005, 11100061, 11100062, 1120023, 1120024, 1180014, and 1180015 **("Property").**

## Anticipated Service Life and Decommissioning Responsibilities

At the end of its project life, the facility shall be decommissioned in accordance with this **Decommissioning Plan ("Plan"), restoring the site to** as close to its agreed-upon post-decommissioned state as practicably possible upon expiration or termination of the Power Purchase Agreement. The Solar Facility carries an expected useful lifetime of 45 years, including potential replacement or upgrades to equipment during that time.

Decommissioning responsibilities include the removal of perimeter fences, any concrete or steel foundations, all metal structures (mounting racks and trackers), all photovoltaic (PV) modules, aboveground and underground cables, transformers, inverters, fans, switch boxes, substation and otherwise restoring the premises to its original condition or mutually-agreed upon state. Other Plan activities include the management of materials and waste, associated erosion & sedimentation control, projected costs, and a decommissioning fund agreement overview.



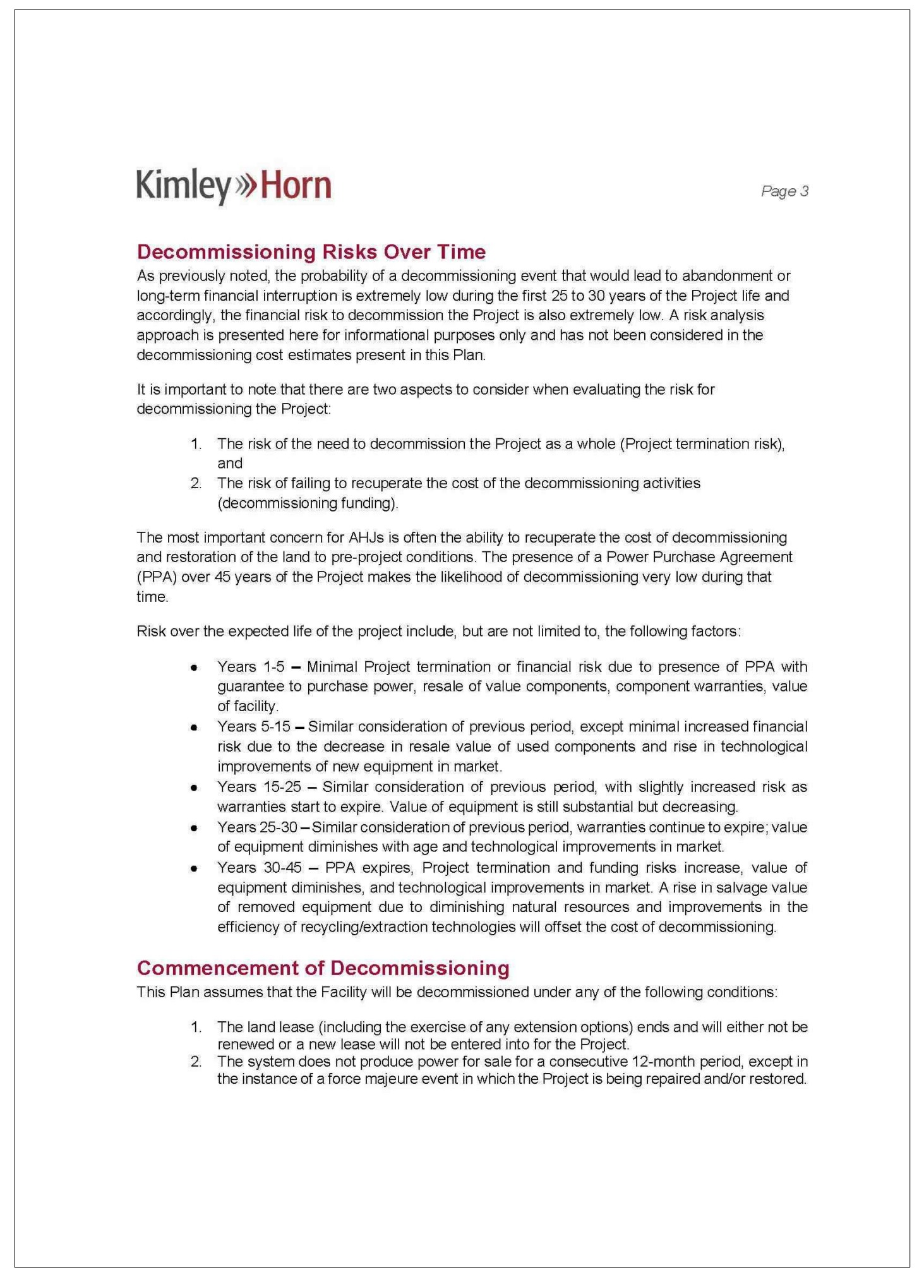
## Decommissioning Risk Over the Lifecycle of a Project

The probability of an event that would lead to abandonment or long-term interruption is extremely low during the first 25 to 30 years of the Project life. Accordingly, the risk of decommissioning the Project is extremely low during this time frame. The reasons why the risk to decommission the Project is extremely low in the early phases of the Project include, but are not limited to:

- Project owners have sophisticated financing structures that allow the lender or tax equity partner to step in and rectify the event that may lead to abandonment.
- Most critical solar components have original equipment manufacturer (OEM) warranties with terms exceeding five years that include labor and parts. A warranty is an agreement or guarantee outlined by a manufacturer to a customer that defines performance requirements for a product or service. Warranties give customers a form of insurance if the purchased product or service does not adhere to quality standards. These warranties assure the Project owner, financing parties, and other stakeholders, that equipment will perform as expected which minimizes the risk of a decommissioning event. Average warranty lengths for critical solar components range from 5 to 10 years, with production warranties on solar panels extending to 25 years.
- Solar projects consist of many networked components designed to convert solar radiation into electrical energy. The failure of any single component will not result in a substantial reduction of energy generation that could lead to a decommissioning event.
- Solar projects are required to maintain replacement value property damage insurance coverage and business interruption insurance coverage. Business interruption insurance covers the loss of income that a business suffers after a disaster or equipment failure. Typical solar business interruption insurance covers income loss for twelve months from the date of the event triggering the loss.
- The replacement costs of solar components will typically decline over time, and accordingly, costs to replace failed or damaged equipment after lapsed OEM warranties will not create large financial hurdles for the Project.
- In the early stages of the Project, the resale value of the equipment is significantly higher than the decommissioning costs, resulting in a net positive (revenue).

Considering the reasons stated above, a decommissioning bond early in the life of a solar project life is not required to assure the coverage facility removal and site restoration costs.

Solar power is an increasingly popular form of renewable energy around the world and as an alternative to the burning of fossil fuels, solar ranks alongside wind and hydropower as essential energy options for the future of the planet. Solar also offers the additional benefit of being easier to build, operate, and decommission with minimal environmental risks. Recent rises in popularity and use can be linked to lower installation and operation costs and it is expected that this pattern will continue, further reducing the risk of a decommissioning event.



## Decommissioning Risks Over Time

As previously noted, the probability of a decommissioning event that would lead to abandonment or long-term financial interruption is extremely low during the first 25 to 30 years of the Project life and accordingly, the financial risk to decommission the Project is also extremely low. A risk analysis approach is presented here for informational purposes only and has not been considered in the decommissioning cost estimates present in this Plan.

It is important to note that there are two aspects to consider when evaluating the risk for decommissioning the Project:

1. The risk of the need to decommission the Project as a whole (Project termination risk), and
2. The risk of failing to recuperate the cost of the decommissioning activities (decommissioning funding).

The most important concern for AHJs is often the ability to recuperate the cost of decommissioning and restoration of the land to pre-project conditions. The presence of a Power Purchase Agreement (PPA) over 45 years of the Project makes the likelihood of decommissioning very low during that time.

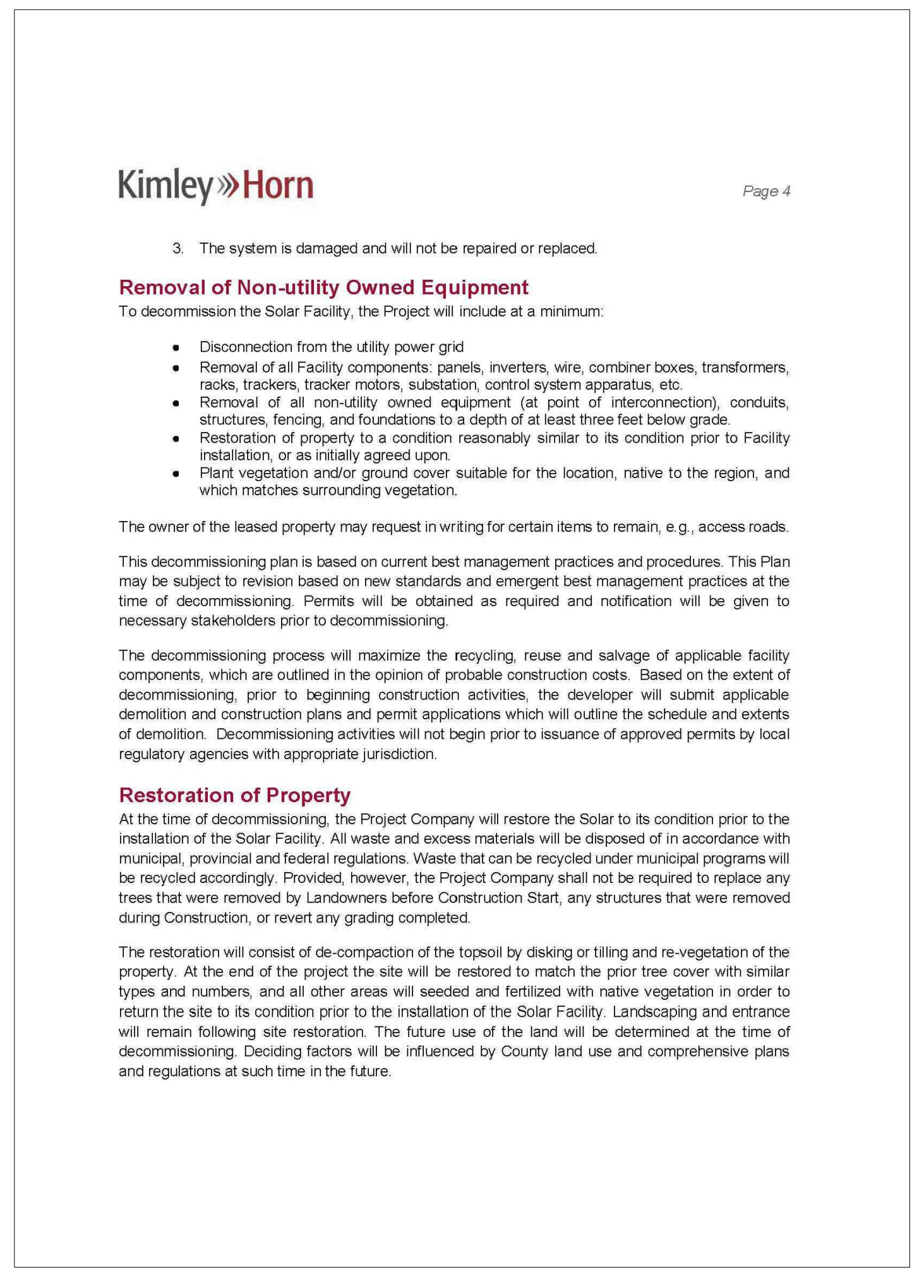
Risk over the expected life of the project include, but are not limited to, the following factors:

- Years 1-5 – Minimal Project termination or financial risk due to presence of PPA with guarantee to purchase power, resale of value components, component warranties, value of facility.
- Years 5-15 – Similar consideration of previous period, except minimal increased financial risk due to the decrease in resale value of used components and rise in technological improvements of new equipment in market.
- Years 15-25 – Similar consideration of previous period, with slightly increased risk as warranties start to expire. Value of equipment is still substantial but decreasing.
- Years 25-30 – Similar consideration of previous period, warranties continue to expire; value of equipment diminishes with age and technological improvements in market.
- Years 30-45 – PPA expires, Project termination and funding risks increase, value of equipment diminishes, and technological improvements in market. A rise in salvage value of removed equipment due to diminishing natural resources and improvements in the efficiency of recycling/extraction technologies will offset the cost of decommissioning.

## Commencement of Decommissioning

This Plan assumes that the Facility will be decommissioned under any of the following conditions:

1. The land lease (including the exercise of any extension options) ends and will either not be renewed or a new lease will not be entered into for the Project.
2. The system does not produce power for sale for a consecutive 12-month period, except in the instance of a force majeure event in which the Project is being repaired and/or restored.



3. The system is damaged and will not be repaired or replaced.

## Removal of Non-utility Owned Equipment

To decommission the Solar Facility, the Project will include at a minimum:

- Disconnection from the utility power grid
- Removal of all Facility components: panels, inverters, wire, combiner boxes, transformers, racks, trackers, tracker motors, substation, control system apparatus, etc.
- Removal of all non-utility owned equipment (at point of interconnection), conduits, structures, fencing, and foundations to a depth of at least three feet below grade.
- Restoration of property to a condition reasonably similar to its condition prior to Facility installation, or as initially agreed upon.
- Plant vegetation and/or ground cover suitable for the location, native to the region, and which matches surrounding vegetation.

The owner of the leased property may request in writing for certain items to remain, e.g., access roads.

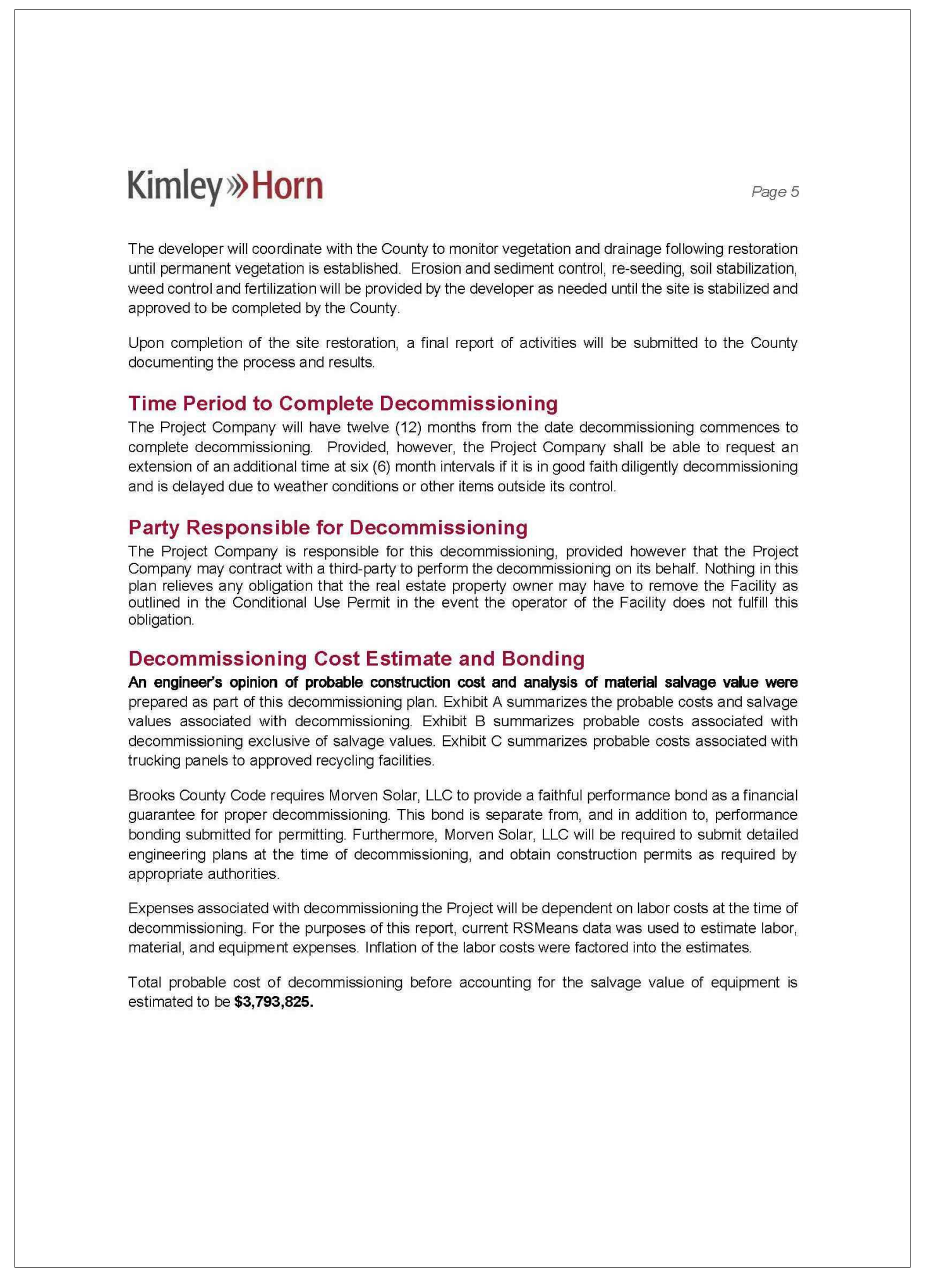
This decommissioning plan is based on current best management practices and procedures. This Plan may be subject to revision based on new standards and emergent best management practices at the time of decommissioning. Permits will be obtained as required and notification will be given to necessary stakeholders prior to decommissioning.

The decommissioning process will maximize the recycling, reuse and salvage of applicable facility components, which are outlined in the opinion of probable construction costs. Based on the extent of decommissioning, prior to beginning construction activities, the developer will submit applicable demolition and construction plans and permit applications which will outline the schedule and extents of demolition. Decommissioning activities will not begin prior to issuance of approved permits by local regulatory agencies with appropriate jurisdiction.

## Restoration of Property

At the time of decommissioning, the Project Company will restore the Solar to its condition prior to the installation of the Solar Facility. All waste and excess materials will be disposed of in accordance with municipal, provincial and federal regulations. Waste that can be recycled under municipal programs will be recycled accordingly. Provided, however, the Project Company shall not be required to replace any trees that were removed by Landowners before Construction Start, any structures that were removed during Construction, or revert any grading completed.

The restoration will consist of de-compaction of the topsoil by disking or tilling and re-vegetation of the property. At the end of the project the site will be restored to match the prior tree cover with similar types and numbers, and all other areas will seeded and fertilized with native vegetation in order to return the site to its condition prior to the installation of the Solar Facility. Landscaping and entrance will remain following site restoration. The future use of the land will be determined at the time of decommissioning. Deciding factors will be influenced by County land use and comprehensive plans and regulations at such time in the future.



The developer will coordinate with the County to monitor vegetation and drainage following restoration until permanent vegetation is established. Erosion and sediment control, re-seeding, soil stabilization, weed control and fertilization will be provided by the developer as needed until the site is stabilized and approved to be completed by the County.

Upon completion of the site restoration, a final report of activities will be submitted to the County documenting the process and results.

## Time Period to Complete Decommissioning

The Project Company will have twelve (12) months from the date decommissioning commences to complete decommissioning. Provided, however, the Project Company shall be able to request an extension of an additional time at six (6) month intervals if it is in good faith diligently decommissioning and is delayed due to weather conditions or other items outside its control.

## Party Responsible for Decommissioning

The Project Company is responsible for this decommissioning, provided however that the Project Company may contract with a third-party to perform the decommissioning on its behalf. Nothing in this plan relieves any obligation that the real estate property owner may have to remove the Facility as outlined in the Conditional Use Permit in the event the operator of the Facility does not fulfill this obligation.

## Decommissioning Cost Estimate and Bonding

**An engineer's opinion of probable construction cost and analysis of material salvage value were** prepared as part of this decommissioning plan. Exhibit A summarizes the probable costs and salvage values associated with decommissioning. Exhibit B summarizes probable costs associated with decommissioning exclusive of salvage values. Exhibit C summarizes probable costs associated with trucking panels to approved recycling facilities.

Brooks County Code requires Morven Solar, LLC to provide a faithful performance bond as a financial guarantee for proper decommissioning. This bond is separate from, and in addition to, performance bonding submitted for permitting. Furthermore, Morven Solar, LLC will be required to submit detailed engineering plans at the time of decommissioning, and obtain construction permits as required by appropriate authorities.

Expenses associated with decommissioning the Project will be dependent on labor costs at the time of decommissioning. For the purposes of this report, current RSMeans data was used to estimate labor, material, and equipment expenses. Inflation of the labor costs were factored into the estimates.

Total probable cost of decommissioning before accounting for the salvage value of equipment is estimated to be **$3,793,825.**

## Resale/Salvage Value Estimate

There is a robust secondary market for resale of solar PV panels worldwide and a network of facilities available for recycling panels. Solar PV panels are estimated to degrade less than 0.5% per year, **meaning they're expected to operate at 90% of capacity after 20 years.** Panel manufacturers will guarantee the performance for each individual module and replace defective modules per the terms of warranty. Panels can therefore be sold for a price higher than their scrap value.

In general, the highest component value would be expected at the time of construction with declining **value over the life of the Project. Over most of the Project's life, components such as the solar panels** could be sold in the wholesale market for reuse or refurbishment. As panel efficiency and power production decrease due to aging and/or weathering, the resale value will decline accordingly. Secondary markets for used solar components include other utility scale solar facilities with similar designs that may require replacement equipment due to damage or normal wear over time; other buyers (e.g., developers, consumers) that are willing to accept a slightly lower power output in return for a significantly lower price point when compared to new equipment. **The solar facility's additional** supporting components, such as inverters, transformers, racking and piles, can be dismantled and resold for scrap value. Inverters and transformers are comprised of salvageable materials such as copper, aluminum, and silver. Piles and other steel components can likewise be recovered and salvaged. Resale values at the end of Year 20 for equipment of significant value were calculated with straight-line depreciation after an instant depreciation of the original material cost.

A current sampling of reused solar panels indicates a wide range of pricing depending on age and condition ($0.10 to $0.50 per watt). Future pricing of solar panels is difficult to predict currently, due to the relatively young age of the market, changes to solar panel technology, and the ever-increasing product demand. Using straight line depreciation, a conservative estimation of the value of solar panels in Year 20 at $0.05 per watt would yield approximately $3,698,544. Increased costs of removal, for resale versus salvage, would be expected to preserve the integrity of the panels; however, the net revenue would still be substantially higher than the estimated salvage value.

The resale value of components such as trackers, may decline more quickly; however, the salvage value of the steel that makes up a larger portion of the tracker is expected to stay at or above the value used in this report.

The price used to value the steel in this report is $160 per ton ($0.08 per lb). The price used to value copper in this report is $2.70 per lb.

Total probable salvage value of decommissioning is estimated to be **$4,891,800.**

## Responsible Party Contact Information

| | |
|---|---|
| Contact: | Pine Gate Renewables<br>Attn: Operations and Maintenance Manager |
| Address: | 130 Roberts Street<br>Asheville, NC 28801 |
| Phone Number: | 855-969-3380 |
| Email: | utility@pgrenewables.com |

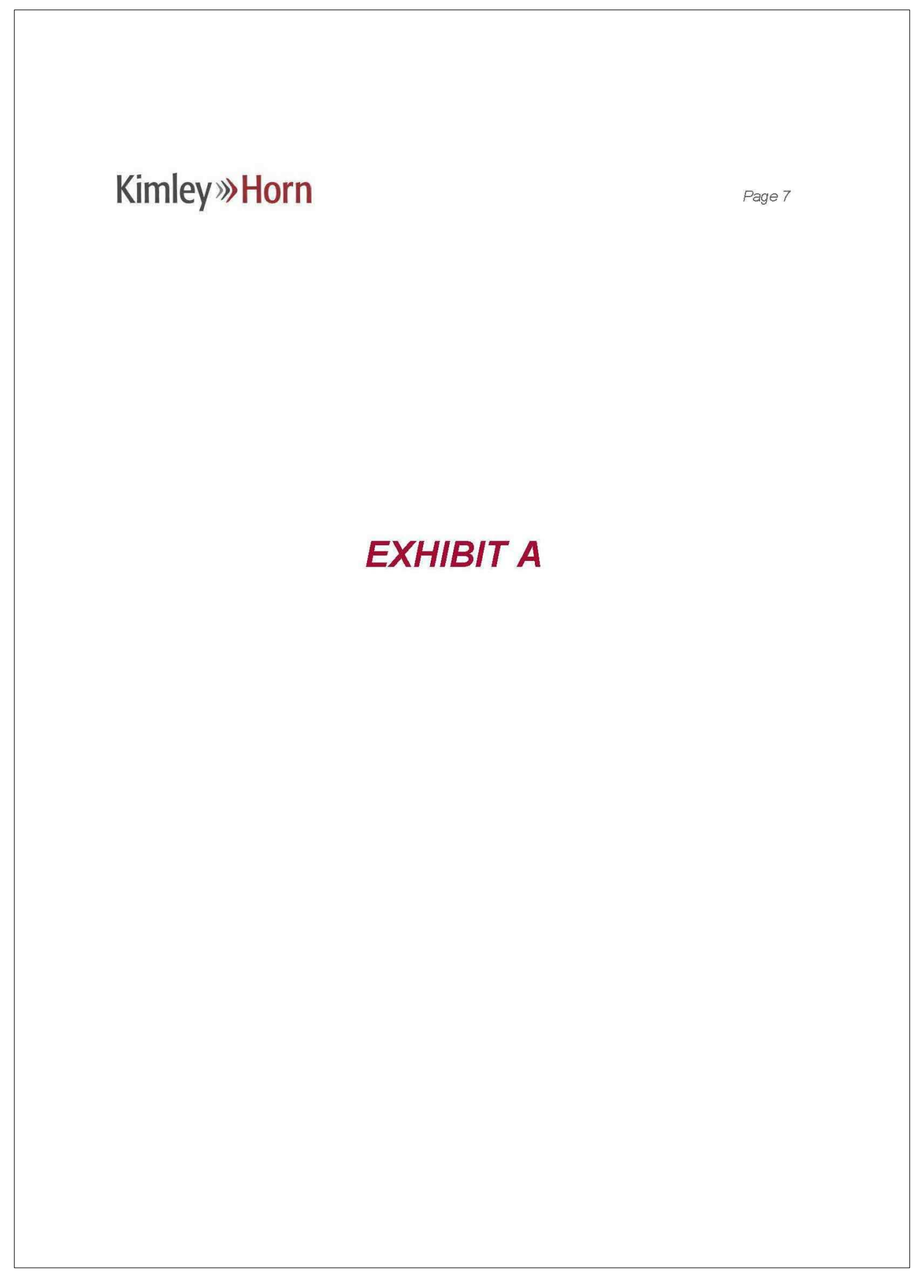
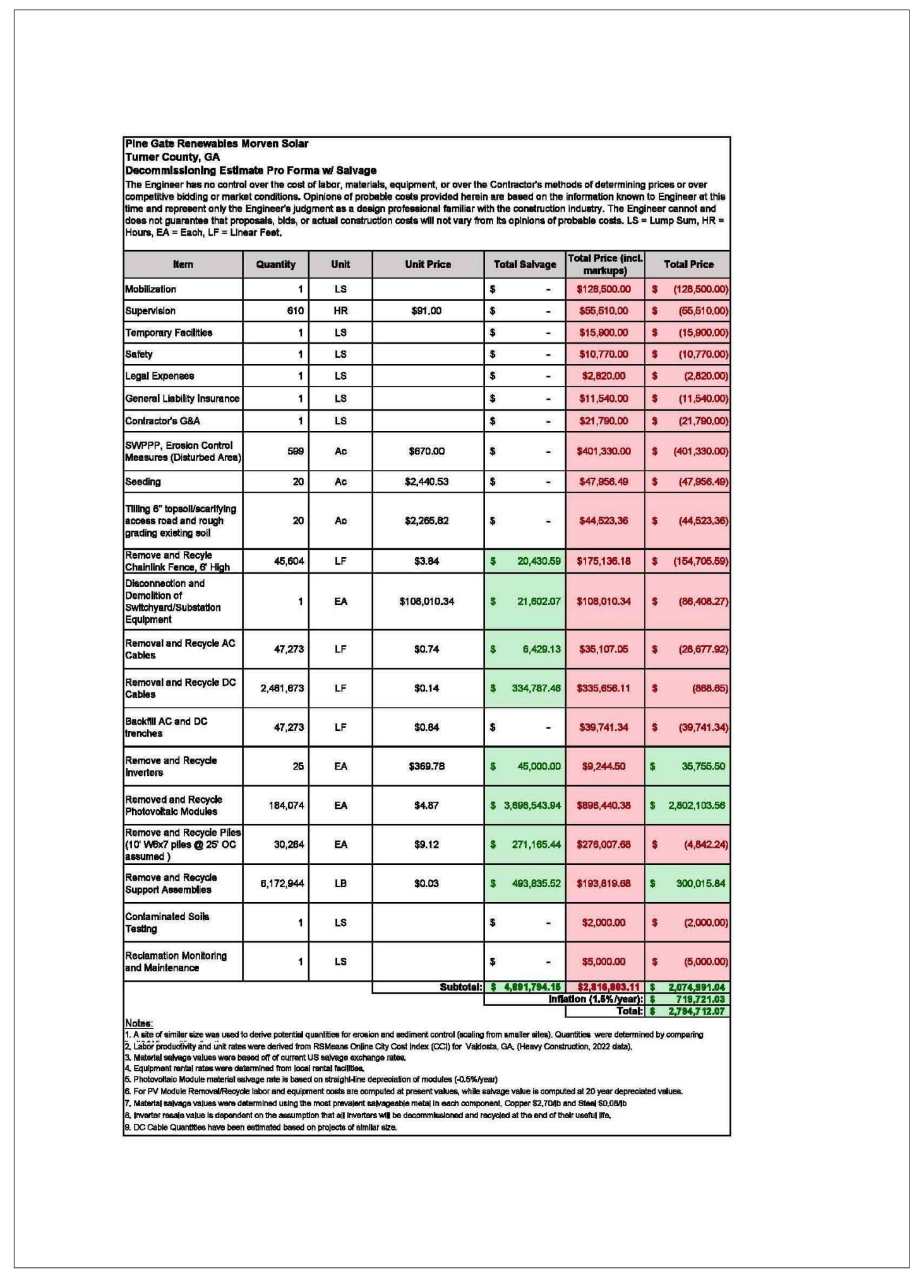


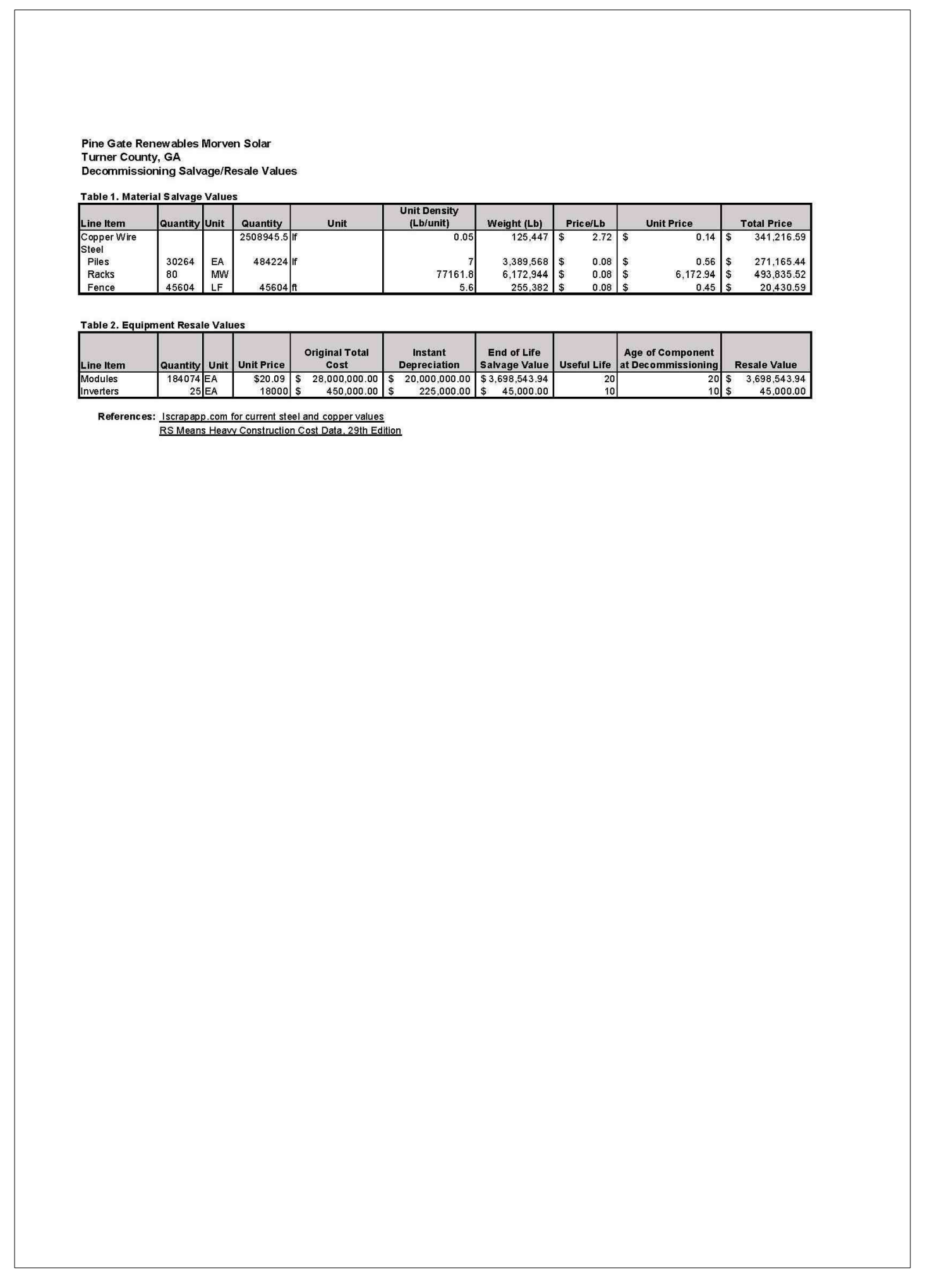
*EXHIBIT A*



**Pine Gate Renewables Morven Solar**
**Turner County, GA**
**Decommissioning Estimate Pro Forma w/ Salvage**
The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs. LS = Lump Sum, HR = Hours, EA = Each, LF = Linear Feet.

| Item | Quantity | Unit | Unit Price | Total Salvage | Total Price (incl. markups) | Total Price |
|---|---|---|---|---|---|---|
| Mobilization | 1 | LS | | $ - | $128,500.00 | $ (128,500.00) |
| Supervision | 610 | HR | $91.00 | $ - | $55,510.00 | $ (55,510.00) |
| Temporary Facilities | 1 | LS | | $ - | $15,900.00 | $ (15,900.00) |
| Safety | 1 | LS | | $ - | $10,770.00 | $ (10,770.00) |
| Legal Expenses | 1 | LS | | $ - | $2,820.00 | $ (2,820.00) |
| General Liability Insurance | 1 | LS | | $ - | $11,540.00 | $ (11,540.00) |
| Contractor's G&A | 1 | LS | | $ - | $21,790.00 | $ (21,790.00) |
| SWPPP, Erosion Control Measures (Disturbed Area) | 599 | Ac | $670.00 | $ - | $401,330.00 | $ (401,330.00) |
| Seeding | 20 | Ac | $2,440.53 | $ - | $47,956.49 | $ (47,956.49) |
| Tilling 6" topsoil/scarifying access road and rough grading existing soil | 20 | Ac | $2,265.82 | $ - | $44,523.36 | $ (44,523.36) |
| Remove and Recyle Chainlink Fence, 6' High | 45,604 | LF | $3.84 | $ 20,430.59 | $175,136.18 | $ (154,705.59) |
| Disconnection and Demolition of Switchyard/Substation Equipment | 1 | EA | $108,010.34 | $ 21,602.07 | $108,010.34 | $ (86,408.27) |
| Removal and Recycle AC Cables | 47,273 | LF | $0.74 | $ 6,429.13 | $35,107.05 | $ (28,677.92) |
| Removal and Recycle DC Cables | 2,461,673 | LF | $0.14 | $ 334,787.46 | $335,656.11 | $ (868.65) |
| Backfill AC and DC trenches | 47,273 | LF | $0.84 | $ - | $39,741.34 | $ (39,741.34) |
| Remove and Recycle Inverters | 25 | EA | $369.78 | $ 45,000.00 | $9,244.50 | $ 35,755.50 |
| Removed and Recycle Photovoltaic Modules | 184,074 | EA | $4.87 | $ 3,698,543.94 | $896,440.38 | $ 2,802,103.56 |
| Remove and Recycle Piles (10' W6x7 piles @ 25' OC assumed ) | 30,264 | EA | $9.12 | $ 271,165.44 | $276,007.68 | $ (4,842.24) |
| Remove and Recycle Support Assemblies | 6,172,944 | LB | $0.03 | $ 493,835.52 | $193,819.68 | $ 300,015.84 |
| Contaminated Soils Testing | 1 | LS | | $ - | $2,000.00 | $ (2,000.00) |
| Reclamation Monitoring and Maintenance | 1 | LS | | $ - | $5,000.00 | $ (5,000.00) |
| | | | Subtotal: | $ 4,891,794.15 | $2,816,803.11 | $ 2,074,991.04 |
| | | | | | Inflation (1.5%/year): | $ 719,721.03 |
| | | | | | Total: | $ 2,794,712.07 |

Notes:
1. A site of similar size was used to derive potential quantities for erosion and sediment control (scaling from smaller sites). Quantities were determined by comparing
2. Labor productivity and unit rates were derived from RSMeans Online City Cost Index (CCI) for Valdosta, GA. (Heavy Construction, 2022 data).
3. Material salvage values were based off of current US salvage exchange rates.
4. Equipment rental rates were determined from local rental facilities.
5. Photovoltaic Module material salvage rate is based on straight-line depreciation of modules (-0.5%/year)
6. For PV Module Removal/Recycle labor and equipment costs are computed at present values, while salvage value is computed at 20 year depreciated values.
7. Material salvage values were determined using the most prevalent salvageable metal in each component. Copper $2.70/lb and Steel $0.08/lb
8. Inverter resale value is dependent on the assumption that all inverters will be decommissioned and recycled at the end of their useful life.
9. DC Cable Quantities have been estimated based on projects of similar size.



**Pine Gate Renewables Morven Solar**
**Turner County, GA**
**Decommissioning Salvage/Resale Values**

**Table 1. Material Salvage Values**

| Line Item | Quantity | Unit | Quantity | Unit | Unit Density (Lb/unit) | Weight (Lb) | Price/Lb | Unit Price | Total Price |
|---|---|---|---|---|---|---|---|---|---|
| Copper Wire | | | 2508945.5 | lf | 0.05 | 125,447 | $ 2.72 | $ 0.14 | $ 341,216.59 |
| Steel | | | | | | | | | |
| Piles | 30264 | EA | 484224 | lf | 7 | 3,389,568 | $ 0.08 | $ 0.56 | $ 271,165.44 |
| Racks | 80 | MW | | | 77161.8 | 6,172,944 | $ 0.08 | $ 6,172.94 | $ 493,835.52 |
| Fence | 45604 | LF | 45604 | ft | 5.6 | 255,382 | $ 0.08 | $ 0.45 | $ 20,430.59 |

**Table 2. Equipment Resale Values**

| Line Item | Quantity | Unit | Unit Price | Original Total Cost | Instant Depreciation | End of Life Salvage Value | Useful Life | Age of Component at Decommissioning | Resale Value |
|---|---|---|---|---|---|---|---|---|---|
| Modules | 184074 | EA | $20.09 | $ 28,000,000.00 | $ 20,000,000.00 | $ 3,698,543.94 | 20 | 20 | $ 3,698,543.94 |
| Inverters | 25 | EA | 18000 | $ 450,000.00 | $ 225,000.00 | $ 45,000.00 | 10 | 10 | $ 45,000.00 |

**References:** Iscrapapp.com for current steel and copper values
RS Means Heavy Construction Cost Data, 29th Edition

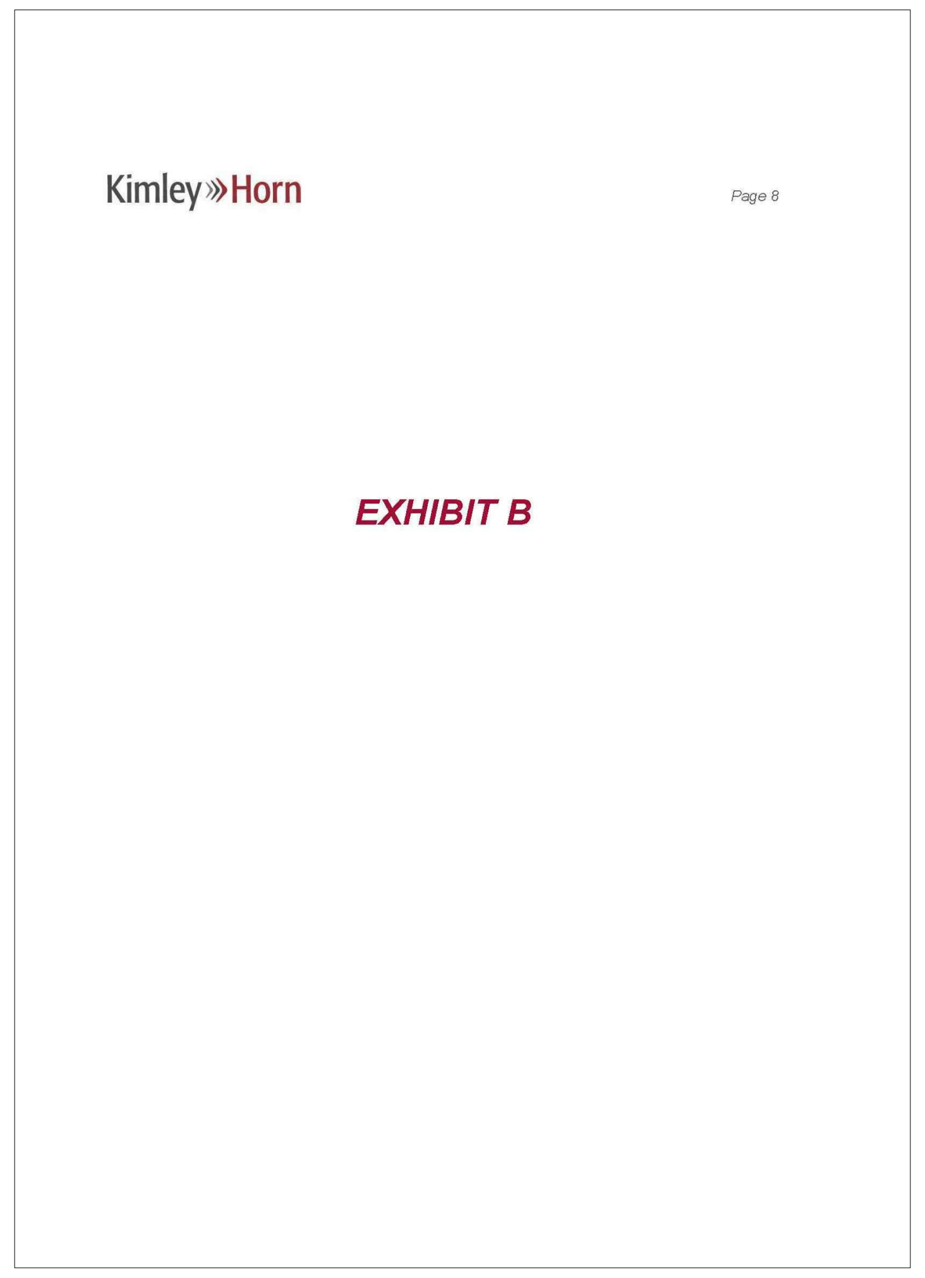
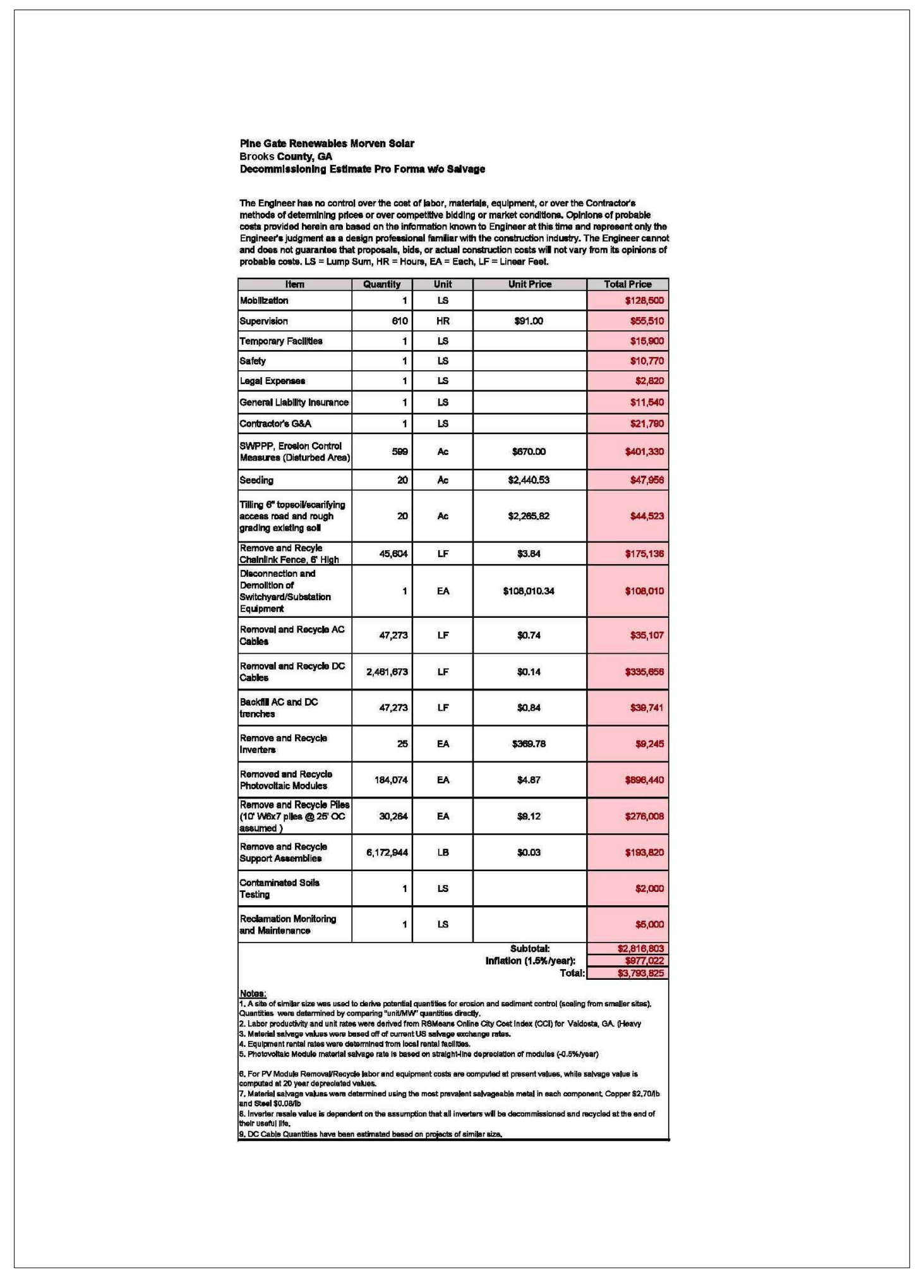


*EXHIBIT B*



**Pine Gate Renewables Morven Solar**
Brooks **County, GA**
**Decommissioning Estimate Pro Forma w/o Salvage**

The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs. LS = Lump Sum, HR = Hours, EA = Each, LF = Linear Feet.

| Item | Quantity | Unit | Unit Price | Total Price |
|---|---|---|---|---|
| Mobilization | 1 | LS | | $128,500 |
| Supervision | 610 | HR | $91.00 | $55,510 |
| Temporary Facilities | 1 | LS | | $15,900 |
| Safety | 1 | LS | | $10,770 |
| Legal Expenses | 1 | LS | | $2,820 |
| General Liability Insurance | 1 | LS | | $11,540 |
| Contractor's G&A | 1 | LS | | $21,790 |
| SWPPP, Erosion Control Measures (Disturbed Area) | 599 | Ac | $670.00 | $401,330 |
| Seeding | 20 | Ac | $2,440.53 | $47,956 |
| Tilling 6" topsoil/scarifying access road and rough grading existing soil | 20 | Ac | $2,265.82 | $44,523 |
| Remove and Recyle Chainlink Fence, 6' High | 45,604 | LF | $3.84 | $175,136 |
| Disconnection and Demolition of Switchyard/Substation Equipment | 1 | EA | $108,010.34 | $108,010 |
| Removal and Recycle AC Cables | 47,273 | LF | $0.74 | $35,107 |
| Removal and Recycle DC Cables | 2,461,673 | LF | $0.14 | $335,656 |
| Backfill AC and DC trenches | 47,273 | LF | $0.84 | $39,741 |
| Remove and Recycle Inverters | 25 | EA | $369.78 | $9,245 |
| Removed and Recycle Photovoltaic Modules | 184,074 | EA | $4.87 | $896,440 |
| Remove and Recycle Piles (10' W6x7 piles @ 25' OC assumed ) | 30,264 | EA | $9.12 | $276,008 |
| Remove and Recycle Support Assemblies | 6,172,944 | LB | $0.03 | $193,820 |
| Contaminated Soils Testing | 1 | LS | | $2,000 |
| Reclamation Monitoring and Maintenance | 1 | LS | | $5,000 |
| | | | Subtotal: | $2,816,803 |
| | | | Inflation (1.5%/year): | $977,022 |
| | | | Total: | $3,793,825 |

Notes:
1. A site of similar size was used to derive potential quantities for erosion and sediment control (scaling from smaller sites). Quantities were determined by comparing "unit/MW" quantities directly.
2. Labor productivity and unit rates were derived from RSMeans Online City Cost Index (CCI) for Valdosta, GA. (Heavy
3. Material salvage values were based off of current US salvage exchange rates.
4. Equipment rental rates were determined from local rental facilities.
5. Photovoltaic Module material salvage rate is based on straight-line depreciation of modules (-0.5%/year)

6. For PV Module Removal/Recycle labor and equipment costs are computed at present values, while salvage value is computed at 20 year depreciated values.
7. Material salvage values were determined using the most prevalent salvageable metal in each component. Copper $2.70/lb and Steel $0.08/lb
8. Inverter resale value is dependent on the assumption that all inverters will be decommissioned and recycled at the end of their useful life.
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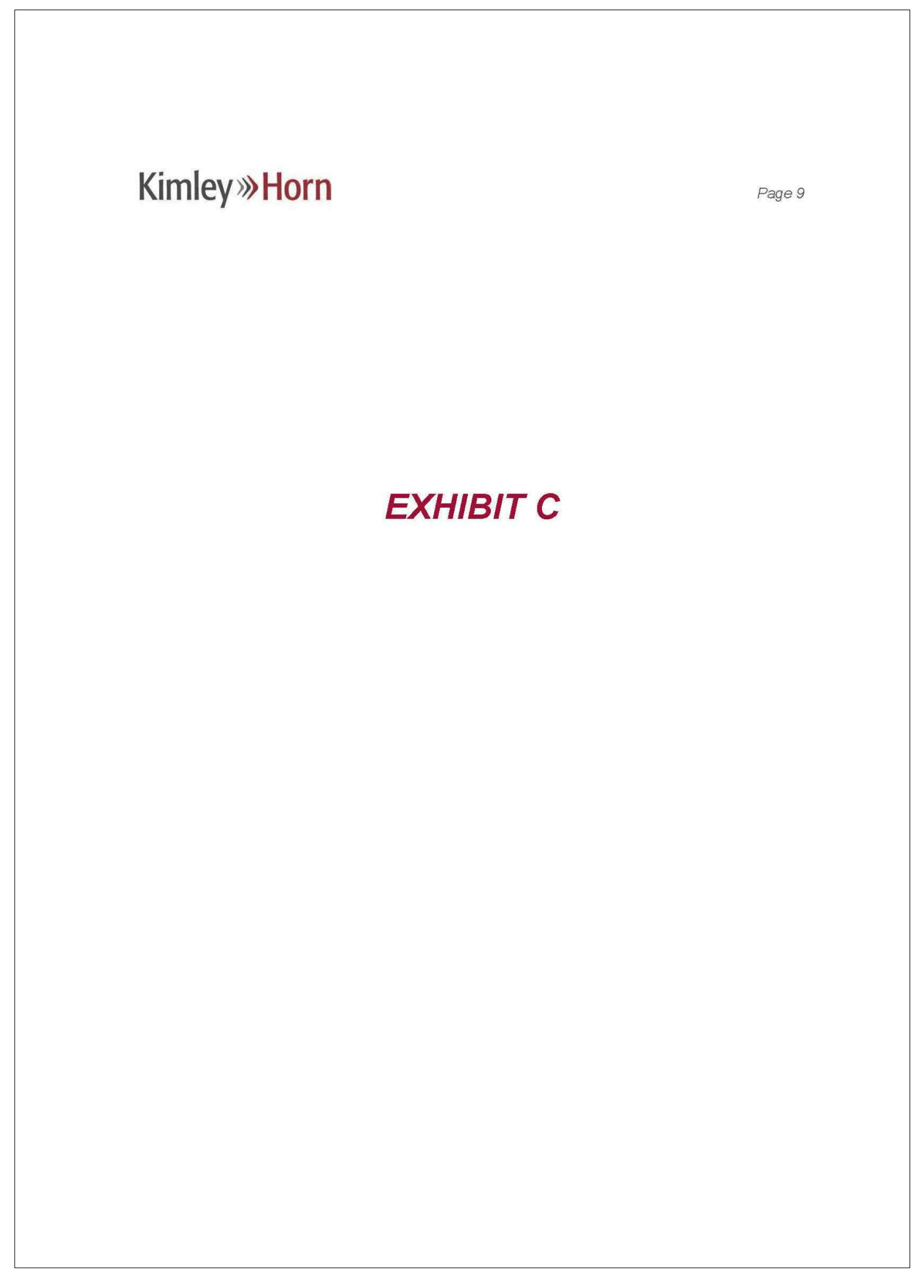
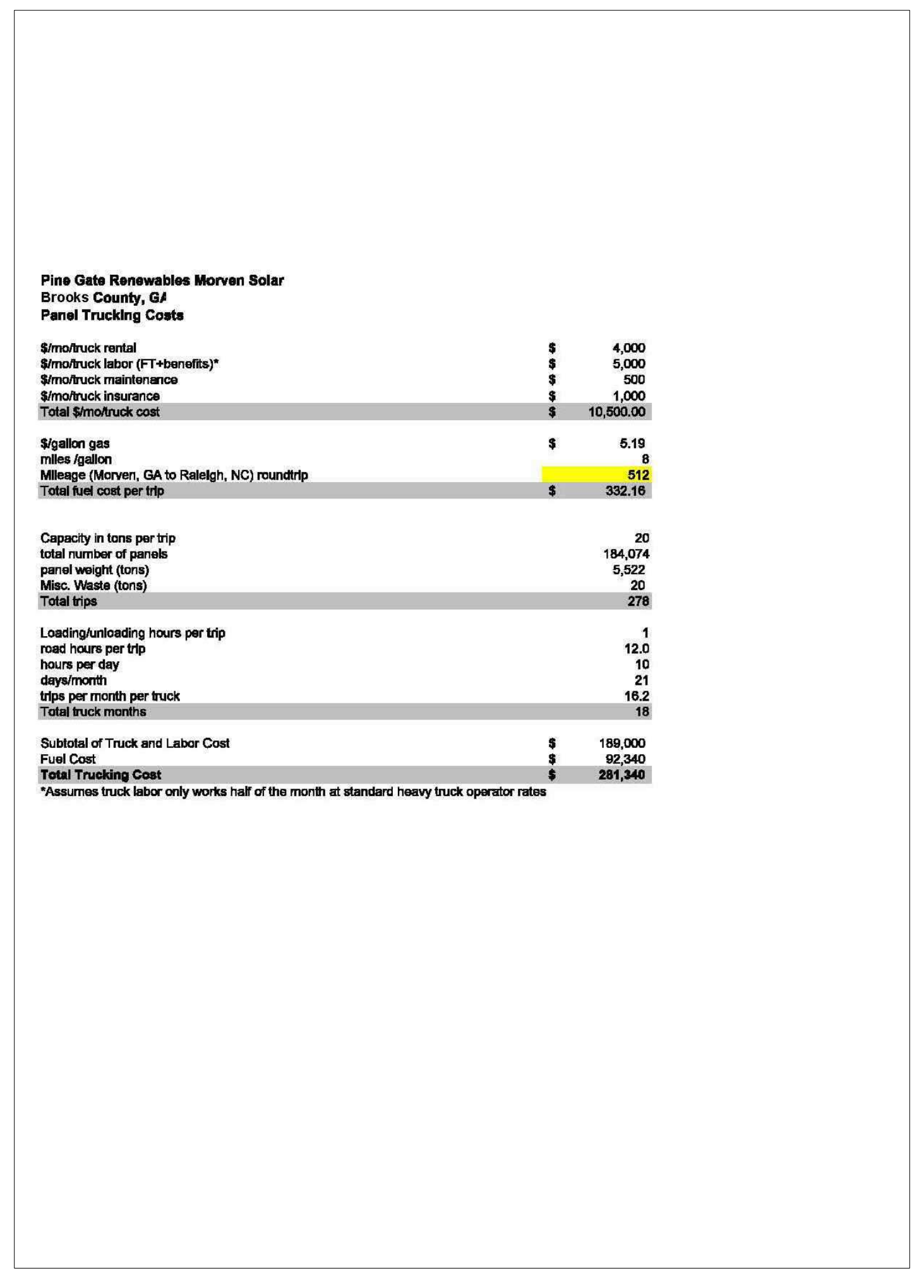


*EXHIBIT C*



**Pine Gate Renewables Morven Solar**
Brooks **County, GA**
**Panel Trucking Costs**

| | | |
|---|---|---|
| $/mo/truck rental | $ | 4,000 |
| $/mo/truck labor (FT+benefits)* | $ | 5,000 |
| $/mo/truck maintenance | $ | 500 |
| $/mo/truck insurance | $ | 1,000 |
| Total $/mo/truck cost | $ | 10,500.00 |
| | | |
| $/gallon gas | $ | 5.19 |
| miles /gallon | | 8 |
| Mileage (Morven, GA to Raleigh, NC) roundtrip | | 512 |
| Total fuel cost per trip | $ | 332.16 |
| | | |
| Capacity in tons per trip | | 20 |
| total number of panels | | 184,074 |
| panel weight (tons) | | 5,522 |
| Misc. Waste (tons) | | 20 |
| Total trips | | 278 |
| | | |
| Loading/unloading hours per trip | | 1 |
| road hours per trip | | 12.0 |
| hours per day | | 10 |
| days/month | | 21 |
| trips per month per truck | | 16.2 |
| Total truck months | | 18 |
| | | |
| Subtotal of Truck and Labor Cost | $ | 189,000 |
| Fuel Cost | $ | 92,340 |
| **Total Trucking Cost** | **$** | **281,340** |

*Assumes truck labor only works half of the month at standard heavy truck operator rates

DECOMMISSIONING PLAN (13 PAGES)

COMPLIES WITH SECTIONS 9-8.6 (G) & (K), SECTION 9-8.10 (E), AND SECTION 9-8.10 (C)(3) OF ORDINANCE

SHEET NAME:

APPENDIX – DECOMMISSIONING PLAN

SHEET NUMBER:

APP-101