APPLICANT & PROPERTY OWNER INFORMATION (Print or Type):

Applicant/Petitioner information: SDG IL DG LLC

Company Name: Solar Development Group LLC

Contact Name and Title: Luis Gonzalez - Development Manager

Phone number: (407)-232-7440

Mailing address for all official correspondence unless a Legal Representative is designated in which case all correspondence and contact will be made with that Legal Representative:

2250 Lucien Way suite 305, Matiland FL Zip: 32751

Property Owner Name(s): Elm Lawn Memorial Park Inc

Phone number: (217)-825-5197

Mailing address: PO Box 588, Taylorville, IL Zip: 62568

Designated Legal Representative *(licensed to practice law in the State of IL)* of Applicant *(if any)*

Name: _____ Phone: _____

Address: _____ Zip: _____

Designated Contact Person *(if different from Applicant),* to whom all phone calls, requests for information, clarifications, and coordinator for all actions regarding this Petition, who has the authority to act on behalf of the Petitioner in regard to this Petition/Application/Request. *This does not apply if a Legal Representative has been designated in which case all contact will be made through that Legal Representative.*

Name: _____ Phone: _____

Address: _____ Zip: _____

PROPERTY INFORMATION:

Note: If additional space is needed, please attach additional sheets to the application and reference attachment description in application.

1. Location of the proposed use or structure, and its relationship to existing adjacent uses or structures:
   An agricultural field situated in North Litchfield township. Additional and adjacent land to Elm Lawm Memorial Park.
2. Legal Description and Acreage:
   PARCEL ID NO.: 10-34-100-019 (27.42 acres) E Clark Street, North Litchfield Township, IL 62056

3. Area and dimensions of the site for the proposed structure(s) or uses.

Approximately 15 acres

4. Present Use of property:

Agricultural field with rotating commodity crops

5. Present Land Classification: Agricultural A-1

6. Proposed Land Use Activity / Nature of the Proposed Use, including type of activity, manner of operation, number of occupants or employees, and similar matters:

Elm Lawn Solar Park - 15 acres solar energy farm

7. Height, setbacks, and property lines of the proposed uses and/or structure(s).

Meeting and exceeding county 's approved solar ordinance design standards

8. Location and number of proposed parking/loading spaces by type of vehicles, to include Weight Classifications and size of access drives/ways.

2 proposed parking parking areas. 20ft wide gravel access roads.

9. Existing and proposed screening, lighting (including intensity) landscaping, erosion control, and drainage) features on the site, including the parking areas.

Existing or planted vegetative screening buffer surrounding the solar facilities.

See narrative and preliminary site plan package for additional details

10. Disclosure of any potential environmental issues and methods for dealing with them.

None identified. See narrative's supporting analysis section for more details.

11. Disclosure of any activities requiring outside agency permits and the names, addresses, and phone numbers of the agency points of contact and how those requirements are being met.

Road use agreement with North Litchfield township. NPDES with the IEPA

12. Indicate the suitability of the property in question for Construction:

Highly suitable for solar development

13. Adjacent Land Use:

A. North: Agricultural residential

B. South: Agricultural

C. East: Elm Lawn Memorial Park - Cemetery

D. West: Agricultural residential

15. Should this Use be valid only for a specific time period? Yes _____ No ✓

If Yes, what length of time? _____

16. Does the proposed Permit meet the following standards? Yes ✓ No _____ *(If not, attach a separate sheet explaining why.)*

A. Will the proposed design, location and manner of operation of the proposed Solar Garden or Solar Farm adequately protect the public health, safety and welfare, and the physical environment?

B. Will the proposed Solar Garden or Solar Farm have a negative impact on the value of neighboring property?

C. Will the proposed Solar Garden or Solar Farm have a negative impact on public utilities and on traffic circulation?

D. Will the proposed Solar Garden or Solar Farm have an impact on the facilities near the proposed Solar Garden or Solar Farm, such as schools or hospitals or airports that require special protection?

ATTACHMENTS REQUIRED:

1. At the time the application is filed, a non-refundable fee is to be paid by the applicant. The application fee $2,500 per megawatt (MW) of proposed nameplate capacity, up to a maximum fee of $250,000.

2. For entities governed by governing boards, a copy of the Board Resolution or Board Meeting Minutes authorizing the governing board's approval to carry out the requested project and to authorize the submission to Montgomery County by a designated entity officer of the required specific requests / applications / petitions is required to be submitted.

3. An area map and site plan from a certified Illinois licensed Engineer.

4. List of the names, current property tax addresses and property tax PIN numbers of property owners located within two-hundred feet and fifty (250') of the property.

5. A Decommissioning plan including:
   A. Process details and cost estimate of decommission.
   B. Anticipated life expectancy of the Solar Farm.
   C. Method of insuring funds will be available for decommissioning and restoration of the project site to its original, natural condition prior to the solar farm construction.
      1. This includes a proposed schedule of payments to be deposited into an escrow account, on a minimum of a yearly basis, held by Montgomery County as assurance for available decommissioning funds.
   D. The cost estimate of decommissioning will be reviewed every five (5) years, by the County's chosen Independent Engineer, and revised if necessary, at the Developers expense. The review and revised plan shall be sent to the Montgomery County Coordinating Office for Board review. If necessary, provisions will be made to the escrow account balance for the decommissioning of the Solar Garden or Solar Farm.

CERTIFICATION OF A SOLAR GARDEN OR SOLAR FARM PERMIT PETITION / APPLICATION / REQUEST

I/We the undersigned, agree that the information herein and attached is true. I/We, the undersigned, do hereby permit officials and/or consultants of Montgomery County, to enter the property described herein to complete a thorough review of this application.

Address: 173 Yaeger Lake Tr, Litchfield, IL 62056

Parcel ID # APN:10-34-100-019 TWP 09 Range 05 Section 34

Applicant's Printed/Typed Name: SDG IL DG LLC - Luis Gonzalez

Signature: _____ Date: 03/10/2026

Property Owner's Printed/Typed Name: ELM LAWN MEMORIAL PARK INC.

Signature: Karl Krumsiek President Date: 3/10/26

Applicant's Legal or other Representative's Printed/Typed Name (*if applicable)*:

_____

Signature: _____ Date: _____

STATEMENT OF CONFORMANCE:

I/We, the undersigned, in making a Petition/ Application / Request to Montgomery County for approval of a Solar Farm or Solar Garden Construction Permit described in this application have reviewed the laws and regulations of Montgomery County to the extent that they are applicable to this proposal and understand that: I/We, the undersigned have no reasonable expectation of approval of this request until such time that a Solar Farm or Solar Garden Construction Permit is actually issued by the Montgomery County and have been so notified of issuance in writing. I/We hereby acknowledge, attest to, and accept the following as conditions of obtaining a Solar Farm or Solar Garden Construction Permit in Montgomery County, Illinois.

- **NO** building, construction, alteration, or use may be started prior to the issuance of a Solar Farm or Solar Garden Construction Permit.
- **All** building construction and all site construction must conform to the plans and specifications approved by the Montgomery County Board. No deviation from or revision to an approved plan may take place without the prior written approval of the Montgomery County Board.
- Any Permit, once issued, is non-transferrable to any other legal entity without the express prior written approval of the Montgomery County Board.
- That **ALL** actions associated with this Permit process shall be taken, processed, and interpreted under the Laws of the State of Illinois and Montgomery County and any legal remedies sought by any party in connection with this Solar Farm or Solar Garden Construction Permit shall be brought forth in the Courts of Montgomery County, Illinois for adjudication.
- That if the applicant is an Agent representing the actual owners of multiple properties, or is a lessor, that the Agent has in their possession signed documentation that the actual property owners are aware of their legal responsibilities to be personally liable for the costs associated with Decommissioning if said lessor or Agent fails for any reason to meet this requirement of the Solar Farm or Solar Garden Construction Permit.

Applicant's Printed/Typed Name: SDG IL DG LLC

Signature: _____ Date: 03/10/2026

Applicant's Legal Representative Printed/Typed Name Signature and Date *(If applicable)*:

_____

Signature: _____ Date: _____

NOTE: It is the responsibility of the Applicant to notify the Montgomery County Coordinating Office at each stage of work completed once the Permit is issued. **Email:** **cbadmins@montgomerycountyil.gov** Phone: 217-532-9577

Address: Montgomery County Coordinator
#1 Courthouse Square – Room 202
Hillsboro, IL 62049

Elm Lawn Solar Park

Request for Solar Farm Development Permit

Montgomery County, IL

March 2026

Elm Lawn Solar Park

Montgomery County, IL

Solar Farm Development Permit Application Narrative

Applicant:
SDG IL DG, LLC
2250 Lucien Way, Suite 305
Maitland, FL 32751

Contacts/Agents:
Luis Gonzalez, Project Development Manager (lgonzalez@esa-solar.com)
Wes Shaffer, Director of Planning & Engagement (wshaffer@esa-solar.com)

Contents

Introduction

Our Request

SDG IL DG, LLC (the "Applicant") requests approval of a Solar Farm Development Permit for a 2-megawatt alternating current (MW-AC) / 3-megawatt direct current (MW-DC) community solar energy facility (the "Project") in unincorporated Montgomery County, Illinois. The Project will be a ground-mounted, tracking solar array located on no greater than 15 acres of a 27.42-acre parcel along E Clark St, west of Yaeger Lake Tr (APN 10-34-100-019). The Applicant has entered into a lease agreement with the property owner, Karl Krumsiek, for the portion of the parcel needed for the proposed facility (see **Appendix A**).

The Project will have a nameplate capacity of 2 MW-AC, delivering renewable energy to the Ameren Illinois distribution grid. It is sized and designed to be eligible for Illinois's community solar programs established under the Climate and Equitable Jobs Act (Public Act 102-0662), expanding access to renewable energy for local homes and businesses, including low- and moderate-income households.

Subject Site and Context

The project parcel occupies both the north and south sides of E Clark St in southeastern Montgomery County, approximately 1.25 miles northeast of Downtown Litchfield. The parcel is currently used for agricultural purposes, just outside City of Litchfield jurisdictional boundary. Surrounding land uses include rural residences to the north, cemetery and wooded habitat to the east, and farmland to the south and west. Yaeger Lake, a small recreational lake, is located to the northeast of the parcel. The site is generally flat within the proposed project area, consistent with the agricultural character of the surrounding landscape.

The Applicant has evaluated the site for environmental and physical constraints. The proposed project footprint avoids identified wetland features located at the northeast corner of the parcel, and the project will maintain appropriate buffers from these features throughout construction and operation. The parcel does not contain known floodplains (see **Appendix M**) or critical habitats within the proposed project footprint.

Applicant Overview

SDG IL DG, LLC is a solar energy development company focused on distributed generation solar projects in Illinois. The Applicant is committed to developing the Project in full compliance with all applicable federal, state, and local regulations and to working collaboratively with Montgomery County throughout the permitting process.

Fig 1. *Illustrative site plan*

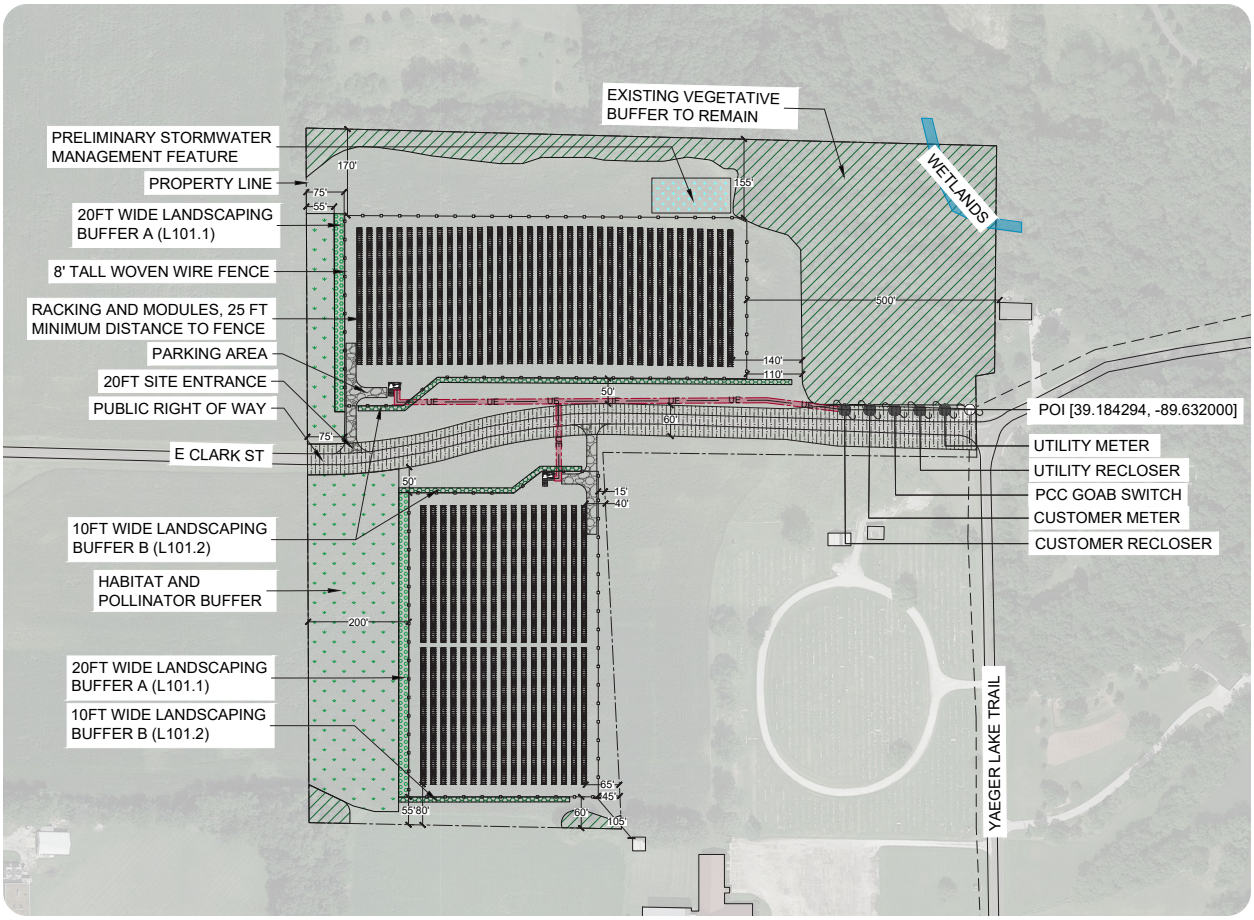


Fig 2. *Site Plan (Sheet G101)*

Project Details

Site Access

The site is accessed via two separate gravel driveways off E Clark St. Both driveways consist of all-weather aggregate surface over geotextile fabric and accommodate maintenance and emergency vehicles.

Utility Connection

The Project will connect to Ameren Illinois's 12.47kV distribution system at a point of interconnection on E Clark St near Yaeger Lake Tr (see **Appendix B**). The Applicant will install the required on-site underground wiring to deliver electricity from the solar arrays to a step-up transformer and associated metering and switching equipment. Ameren Illinois will own and install five overhead utility poles along E Clark St to complete the interconnection, appearing as a visual extension of the existing overhead distribution infrastructure. As identified in Ameren's Level 4 Feasibility and System Impact Study (DER-63100), Ameren will upgrade approximately 1,000 feet of existing distribution line, benefiting local customers along this corridor. Ameren will perform all utility-side work in accordance with its interconnection standards. Electricity produced by this solar project will serve the Litchfield Substation.

System Components

Solar Panels. The Project will use bifacial, anti-reflective photovoltaic (PV) panels to maximize energy yield and minimize glare. All modules will feature tempered, anti-glare, non-reflective surfaces, consistent with Section F.2.h of the Solar Ordinance.

Racking. The Project will mount PV panels on a single-axis tracking system, engineered for durability and optimized for the site's solar exposure. No PV equipment will exceed 20 feet in height at full tilt, in compliance with Ordinance Section F.2.f and state statute 55 ILCS § 5/5-12020(e)(5)

Inverters and Transformer. String inverters will convert DC electricity to AC, and two step-up transformers will adjust voltage for grid delivery. The Applicant will place this equipment on concrete pads within the fenced area, locating them to minimize impacts on adjacent properties.

Control System. The facility will use a monitoring system to track performance and allow for remote diagnostics and control.

Fencing. The Applicant will install an eight-foot woven security fence around the perimeter of the solar equipment, in accordance with Ordinance Section F.2.i. The Applicant will place the fence on the interior of the required vegetative buffer and will maintain it throughout the life of the facility

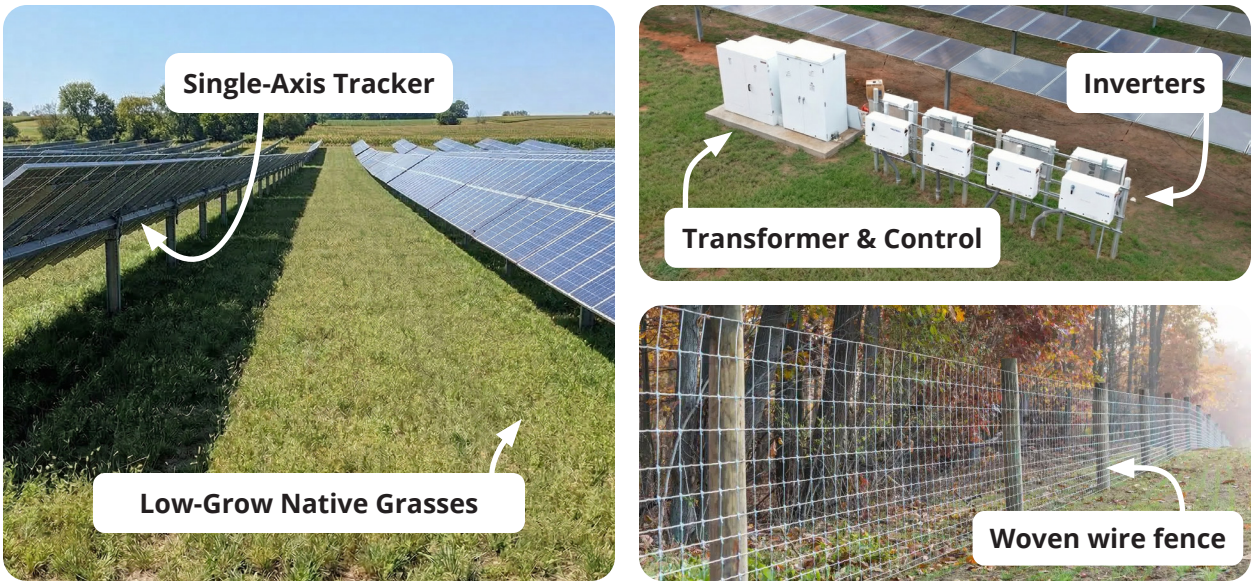


Fig 3. *Examples of system components*

Design Standards

Lot Coverage

The Ordinance exempts ground-mount solar systems from impervious surface calculations where the operator does not compact the soil under the collector and maintains it in vegetation (Section F.2.a). The Applicant will maintain perennial vegetative ground cover beneath and between the arrays, consistent with this provision.

Setbacks

The facility will meet setback requirements established by Ordinance Section F.2.f and state statute 55 ILCS § 5/5-12020(e)(3): at least 50 feet from all non-participating property lines and public rights-of-way, and at least 150 feet from the nearest point of the outside wall of any occupied community building or dwelling. Elm Lawn Cemetery (PID: 10-34-100-016) is a participating property with a reduced internal setback of 15 feet.

Height

All PV equipment will remain under 15 feet in height, measured from natural grade to the top of the solar panels at full tilt, as required by the Montgomery County Solar Ordinance (Section C.9) and state statute 55 ILCS § 5/5-12020(e)(5).

Landscaping

The Applicant will maintain managed vegetative buffers around the perimeter of the exterior fencing, in accordance with Ordinance Section F.2.a. The Applicant will use native, non-invasive, pollinator-friendly species (including evergreen and deciduous trees, native shrubs, and pollinator groundcover) to screen the facility from public roads and neighboring properties. Where feasible, the Applicant will preserve existing tree cover and supplement it with new plantings.

Visual Renderings

The following renderings depict the project site five years after construction, once planted vegetation has established; viewed from key vantage points during winter conditions.

Fig 4. *Illustrative site plan*

Fig 5. *E Clark St, looking northeast toward Operational Area #1, after 5 years of growth*

Fig 6. *E Clark St, looking southeast toward Operational Area #2, after 5 years of growth*

Fig 7. *E Clark St, looking southwest toward Operational Area #2, after 5 years of growth*

Fig 8. *Elizabeth Dr, looking northwest toward Operational Area #2, after 5 years of growth*

Project Management

Construction

Construction will begin once the Applicant secures all required federal, state, and local permits, including the Montgomery County Solar Farm Development Permit and Construction Permit. The buildout is expected to take approximately 6 to 9 months. Construction access will be from Yaeger Lake Trail via an existing or improved access road. The Applicant will coordinate any road use agreements with the appropriate road authority.

Prior to any ground disturbance, the Applicant will install erosion and sediment control measures in accordance with an approved Stormwater Pollution Prevention Plan (SWPPP) and Illinois EPA standards (see **Appendix C** for a Preliminary SWPPP). The Applicant will obtain an IEPA NPDES ILR10 general permit for stormwater discharges associated with construction activity. Measures may include silt fencing, sediment traps, and stabilized construction entrances to control runoff and protect nearby properties and waterways, including Yaeger Lake. A final SWPPP will be completed to reflect final designs for building permit submission.

Operation

The owner/operator will monitor the facility remotely and conduct periodic on-site inspections. Locked gates, warning signage, and an emergency contact posting will be maintained at the site entrance. Emergency shutdown procedures will be made available to local first responders. String inverters produce minimal sound during daytime operation and no sound at night.

Table A. Peak daily traffic estimates throughout the life of the Project

Phase	Duration	CDL Trips/Day	Non-CDL Trips/Day	Total Trips/Day
Site Preparation	2–4 weeks	2	5	7
Racking & Panel Delivery	2–4 weeks	5	20	25
Installation	8–12 weeks	1	30	31
Operation	35+ years	0	1	1
Decommissioning	6–8 weeks	8	20	28

Note: Some construction phases may overlap. CDL = Commercial Driver's License. Trip counts represent peak daily estimates.

Decommissioning

The Applicant has submitted a decommissioning plan (see **Appendix D**) consistent with the Illinois Department of Agriculture's (IDOA) standard Solar Agricultural Impact Mitigation Agreement (AIMA) template in effect on December 31, 2022, as required by Section G.2 of the Ordinance and the Agricultural Impact Mitigation Act (505 ILCS 147, Section 17.D). On March 4, 2026, the Applicant and IDOA entered into an AIMA (see **Appendix E**)

The anticipated operational life is 40 years. At the end of its useful life, all above-ground and below-ground components will be removed and the site restored for agricultural use. Financial assurance will be provided through escrow payments deposited with Montgomery County. The cost estimate will be reviewed every five (5) years by the County's independent engineer.

Site Prep
Stake, install erosion control, build access drive, clear/spot grade.

Seed as needed
Seed to reestablish groundcover before pile delivery.

Deliver piles/racking
Flatbed trucks deliver piles and racking pieces.

Install posts
GPS enabled pile driver installs posts.

Assemble racking
Construction workers assemble racking.

Deliver modules
Flatbed trucks deliver solar modules.

Module installation
Workers install and wire panels, inverters, and transformer.

Interconnection
Test and connect the facility to the grid for power distribution.

Fig 9. *General construction sequence*

Adherence to Zoning Code

Ordinance for Solar Energy Farm and Solar Garden Installations

Montgomery County first adopted a solar ordinance in 2023 with multiple revisions in the interim, including the most recent from October 2025. Tables B and C summarize the Project's adherence and compliance with the ordinance.

Table B. Requirements for Principle Use Solar Farms (Section E)

Subsection	Statement of Adherence
1. Approved Solar Components.	The Applicant will install solar modules, inverters, and racking components that carry UL listing or an approved equivalent certification. All photovoltaic modules will hold UL 61730 (or UL 1703) certification. String inverters will carry UL 1741 certification. The Nextracker NX Gemini single-axis tracker racking system holds UL 2703 / UL 3703 / IEC 62817 certification. The Applicant will confirm all component certifications and submit specification sheets to the County prior to construction as part of the building permit application.
2. Compliance with Building Code.	The Applicant will design, construct, and commission the Elm Lawn Solar Park in compliance with the International Building Code, as amended. The Applicant will obtain approval from the county building code official consistent with the building codes in existence at the time of application. Full code compliance documentation will be addressed at the building permit stage.
3. Compliance with State Electric Code.	The Applicant will design and install the photovoltaic system in compliance with the National Electrical Code (NEC), as amended. A licensed Professional Engineer will prepare and seal the electrical design drawings. Sheets E101 and E102 include an electrical plan and single-line diagram details that conform to NEC Article 690 (Solar Photovoltaic Systems) and Article 705 (Interconnected Electric Power Production Sources).
4. Compliance with State Plumbing Code.	This requirement does not apply to the Elm Lawn Solar Park. The Project does not include solar thermal systems or any components that interface with plumbing infrastructure. No hot water systems are proposed as part of this installation.
5. Compliance with State Energy Code.	The Applicant will design and install the photovoltaic system in compliance with the Illinois State Energy Code. All solar modules, inverters, and associated electrical equipment will meet or exceed the performance and safety standards prescribed by the Code.

Table B. Requirements for Principle Use Solar Farms (Section E)

Subsection	Statement of Adherence
6. Compliance with State Drainage Laws.	The Applicant will design and operate the Elm Lawn Solar Park in compliance with all applicable State Drainage Laws. **Appendix C** includes a preliminary Stormwater Pollution Prevention Plan (SWPPP). The plan addresses stormwater conveyance through a northeast stormwater feature and accounts for identified wetland features on the Property. The Applicant will finalize the SWPPP following completion of field surveys and wetland delineation, and will obtain coverage under IEPA General NPDES Permit No. ILR10 prior to initiating construction.
7. Utility Notification.	The Applicant has completed the Ameren Illinois interconnection study process for the Elm Lawn Solar Park (DER-63100). The Project will interconnect to Ameren Illinois's 12.47 kV distribution system on the Litchfield N95-823 feeder. The Applicant will execute all interconnection agreements and complete all utility-required upgrades prior to energizing the facility (see **Appendix B**).
8. Agricultural Protection.	The Applicant has executed an Agricultural Impact Mitigation Agreement (AIMA) with the Illinois Department of Agriculture (IDOA) pursuant to the Renewable Energy Facilities Agricultural Impact Mitigation Act (505 ILCS 147). The AIMA (see **Appendix E**) establishes minimum standards for topsoil segregation, rock removal, drainage tile repair, weed control, and site restoration during construction and decommissioning. The Applicant will file the executed AIMA with the County prior to commencement of construction and will incorporate all AIMA provisions into the construction and decommissioning plans.
9. Endangered Species and Wetlands.	The Applicant has initiated consultation with the Illinois Department of Natural Resources (IDNR) through the Ecological Compliance Assessment Tool (EcoCAT). The IDNR review (see **Appendix F**) identified no records of State-listed threatened or endangered species, Illinois Natural Area Inventory sites, dedicated Illinois Nature Preserves, or registered Land and Water Reserves in the vicinity of the Project. The Applicant consulted the USFWS Information for Planning and Consultation (IPaC) tool, showing the project is outside any wildlife protection areas (see **Appendix G**).
10. Stormwater and NPDES	The Applicant will obtain coverage under the Illinois General NPDES Permit for Storm Water Discharges from Construction Site Activities (ILR10) prior to initiating Project construction. The Project disturbs more than one acre of land and therefore triggers NPDES permitting requirements. The Applicant has prepared a preliminary SWPPP that identifies structural and non-structural best management practices (BMPs) including silt fencing, stabilized construction entrances, sediment basins, and erosion control blankets. The Applicant will finalize the SWPPP and file a Notice of Intent (NOI) with IEPA prior to any soil-disturbing activities.

Table C. Requirements for Principle Use Solar Farms (Section F.2.)

Subsection	Statement of Adherence
a. Ground Cover and Buffer Areas.	Top soils will not be removed during development. The Applicant will plant and maintain the site in perennial, native vegetation to prevent erosion, manage runoff, and build soil, in compliance with the Illinois Noxious Weed Law (505 ILCS 100) and the Illinois Endangered Species Protection Act (520 ILCS 10/11(b)). A managed vegetative buffer will be maintained around the exterior perimeter of fencing and gates at all times. Per the site plan (Sheets G101/L101), the project provides the following buffers: 20-foot-wide landscaping (Buffer A) along the west side of both operational areas; 10-foot-wide landscaping (Buffer B) along both sides of E Clark St; a Habitat and Pollinator Buffer along the west property line using native warm season grasses and pollinator plants; and preserved existing vegetation to the north and east of Operational Area 1, which provides established screening from adjacent parcels. Ground-mount areas with non-compacted soil maintained in vegetation are exempt from impervious surface calculations. Access roads use crushed aggregate on geotextile fabric with 2–4% slope for proper drainage.
b. Foundations.	Prior to construction, a qualified Illinois-licensed Professional Engineer will certify that the foundation and design of the solar panel racking and support is within accepted professional standards given local soil and climate conditions. The project utilizes single-axis tracker racking systems with driven steel piles. The maximum panel height will not exceed fifteen (15) feet at full tilt (55°), well within the 30-foot ordinance maximum. Racking details are shown on Sheet Q501.
c. Other Standards and Codes.	The Project will comply with all applicable local, state, and federal regulatory codes, including: the International Building Code (as amended), the National Electric Code (as amended), the Illinois State Energy Code, all County building codes in effect at the time of application, ANSI standards, and UL listings (or approved equivalent). All solar energy system components will have a UL listing or approved equivalent. The inverter equipment is compliant with IEEE 1547 and UL 1741 per the Ameren feasibility study.
d. Power and Communication Lines.	Power and communication lines running between banks of solar panels and to the point of interconnection (POI) will be buried underground per the National Electric Code. The site plan (Sheet G101/E102) shows both underground and overhead interconnection paths. Underground electrical lines run from the inverters/MV transformers to the POI area near Yaeger Lake Trail. The overhead interconnection connects to the existing 12.47kV Ameren distribution line (Circuit N95-823). The POI is located at coordinates [39.184294, -89.632000].

Table C. Requirements for Principle Use Solar Farms (Section F.2.)

Subsection	Statement of Adherence
e. Site Plan Required.	A detailed site plan has been prepared by ESA Solar Energy, LLC, sealed by David K. Click, PE (IL License #062.076524, NABCEP PVIP #041704-8). The plan set (dated March 17, 2026) includes: Cover Sheet (G001), General Notes (G002), Site Plan (G101) at 1"=105' scale, Project Area Plan (G102) with adjacent property owners identified by PID, Contour Map (C101) showing existing topography (200'–210' elevation), Traffic Turning Plan (C103) for semi-trailer truck access, Landscaping Plan (L101) with buffer and species details, Racking Details (Q501), Panel Specifications (Q502), Single Line Diagram (E101), and Electrical Plan (E102). The plans show location of all solar arrays, property lines, rights-of-way, fencing, access roads, wetlands, topography, stormwater features, setback dimensions, and all electric equipment.
f. Setbacks.	The project meets or exceeds all required setbacks per the ordinance. Per the site plan (Sheet G101): the project maintains a 50-foot minimum setback from all non-participating property lines; a 50-foot minimum setback from the right-of-way of Yaeger Lake Trail and E. Clark Street; and a 150-foot minimum setback from the nearest occupied dwelling. Elm Lawn Cemetery (PID: 10-34-100-016) is under common ownership with the project parcel and is included as a participating property; per Section F.2.f, the 50-foot setback does not apply at the point of connection between adjoining participating properties. The setback from the cemetery boundary to the perimeter fence is 15 feet or more. All setbacks are measured from the exterior of the required perimeter fencing.
g. Aviation Protection.	The project site is not located within 500 feet of an airport or within approach zones of an airport (see **Appendix H** for FAA Notice Criteria). Solar glare analysis is not required, but the Applicant has included one as **Appendix I**.
h. Glare.	The solar panels will have tempered, anti-glare, non-reflective surfaces (per General Note #5, Sheet G002).
i. Safety Fencing	An 8-foot-high woven fence will be installed around the entire exterior perimeter of the solar farm, on the interior side of the vegetative buffer (per General Note #2, Sheet G002). This exceeds the minimum 6-foot height requirement. Fencing will be maintained in serviceable condition for the life of the project and will remain in place until the solar farm is properly decommissioned, even if the facility becomes non-operational.
j. Gates and Locks.	Gates will be equipped with locks and will remain locked at all times except during authorized ingress/egress or when the owner/operator or their agents are present and monitoring the facility. An emergency contact name and phone number will be posted at the point of access (per Section D.6 of the ordinance).

Findings of Fact

The Montgomery County application requires the Applicant to address four specific questions regarding the proposed Project. The Applicant's responses to each are provided below.

Q1: Will the proposal protect public health, safety, welfare, and the physical environment?

Yes. The Applicant has designed, sited, and will operate the Project to fully protect public health, safety, welfare, and the physical environment. Solar photovoltaic systems generate electricity from sunlight with no combustion, no emissions, no fuel storage, and no water consumption during operation. Research published by the NC State University Clean Energy Technology Center (see **Appendix J**) shows that modern solar panels do not pose meaningful risks related to toxicity, electromagnetic fields (EMF), fire, or electric shock under normal operating conditions. Manufacturers encapsulate panels in tempered glass and sealed frames that prevent leaching of trace materials, and all electrical components meet UL and IEEE safety standards.The Applicant will comply with all applicable safety codes, including the International Building Code and National Electric Code. The Applicant will install security fencing, locked gates, and warning signage to prevent unauthorized access, and will post an emergency contact at the site entrance. All equipment will carry UL listing or an approved equivalent, and the Applicant will coordinate with local emergency services to provide any materials or training necessary for safe emergency response.With respect to the physical environment, the Applicant will preserve topsoil, re-vegetate disturbed areas with perennial and pollinator-friendly groundcover consistent with the Illinois Pollinator-Friendly Solar Site Act (525 ILCS 55) and IDNR recommendations, and manage stormwater through an approved SWPPP and NPDES ILR10 permit. The IDNR EcoCAT consultation (see **Appendix F**) and USFWS IPaC review (see **Appendix G**) show that the Project will not adversely affect endangered species or sensitive habitats. IDNR terminated the consultation with no further action required.

Q2: Will the proposal negatively impact on the value of neighboring property?

No. Available research indicates that small-scale solar facilities do not negatively impact neighboring property values. A 2024 study by Loyola University Chicago (see **Appendix K**) researchers Hao and Michaud, focused specifically on the Midwest, found that solar projects under 20 MW in capacity produced minor positive effects on surrounding property values. This finding aligns with the broader body of academic literature, including studies by the U.S. Department of Energy's Lawrence Berkeley National Laboratory, which have

found no statistically significant negative impact on property values from proximity to solar installations. The Project's setbacks (50 feet from property lines, 150 feet from dwellings), perimeter fencing, and maintained vegetative buffers will further ensure visual and physical separation from neighboring properties. The low profile of the installation (under 15 feet maximum height at full tilt) and the agricultural character of the surrounding area mean the facility will blend with the rural landscape.

Q3: Will the proposal negatively impact on public utilities and traffic circulation?

No. Once operational, the Project will generate minimal traffic. Routine maintenance will require, at most, a few vehicle trips per month, comparable to typical agricultural activity on the parcel. The facility will operate autonomously with remote monitoring and will not require on-site staff. During the construction phase (approximately 6–9 months), the Applicant anticipates temporary and manageable construction traffic along E Clark St. The Applicant does not anticipate any oversized or overweight loads. The **Table A** on page 10 summarizes the Applicant's peak daily traffic estimates throughout the life of the Project With respect to public utilities, the Project will interconnect with the existing Ameren Illinois distribution system and will not require upgrades to public water, sewer, or other municipal utility infrastructure. The facility will improve local grid reliability by generating clean energy close to the point of consumption.

Q4: Will the proposal impact on nearby facilities such as schools, hospitals, or airports?

No. The Project will not adversely impact nearby schools, hospitals, or airports. The nearest hospital, HSHS St. Francis Hospital, is located approximately 1,000 feet southwest of the project site. The passive nature of solar operations (no combustion, no emissions, no hazardous materials storage, no significant noise, and no increase in sustained traffic) means the Project will not interfere with hospital operations or emergency access routes. The nearest public schools are located approximately 1 mile from the project site. The Applicant has completed the FAA Notice Criteria Tool screening for the Elm Lawn site (coordinates 39.184913, -89.634755), which confirms that the Project does not exceed notice criteria for proximity to aviation facilities. The Litchfield Municipal Airport is located approximately 2 miles west of the site. The FAA tool result is included as **Appendix H**. Given the distances involved and the passive nature of solar operations, the Project will have no impact on any nearby school, hospital, or airport.

Additional Plans & Analysis

Vegetation Management Plan

1. Vegetation Goals

The Applicant will establish and maintain native grass and prairie vegetation within the solar array to minimize erosion, maintain low-growing ground cover compatible with facility operations, promote soil health and pollinator habitat, and comply with the Illinois Pollinator-Friendly Solar Site Act (525 ILCS 55), the Illinois Noxious Weed Law (505 ILCS 100), and IDNR recommendations.

2. Recommended Seed Mix

The Applicant will seed under-array areas with a native cool-season grass base (including Virginia Wildrye, Canada Wildrye, Prairie Junegrass, and Cluster Fescue) to establish rapid ground cover and long-term soil stabilization. The Applicant will supplement this base with compatible warm-season grasses and native forbs consistent with Natural Resources Conservation Service (NRCS) Practice Code 327 (**Appendix L**) to improve habitat value and ecological diversity as the stand matures. Perimeter landscaping buffers will follow the separate species palette detailed in the Landscaping Plan (Sheet L101). Species and seed mixes listed are illustrative and may change based on supplier availability and consultation with the Montgomery County Soil and Water Conservation District (SWCD).

3. Establishment and Maintenance

The Applicant will prepare the site by removing existing vegetation through mowing, herbicide application, or other standard methods, and will seed during late fall or early spring consistent with NRCS planting windows. The Applicant will test soil pH prior to seeding and apply phosphorus, potassium, and lime as needed (but will not apply nitrogen) per NRCS guidance. During the first two growing seasons, the Applicant will mow three to four times per season to control broadleaf weeds, keeping mowing height above the native grass canopy and never below 10 inches in the second year. Native warm-season grasses typically require three to five years to fully establish; the Applicant will not consider a stand unsuccessful until after the third growing season.

4. Long-Term Vegetation Management

Once established, the Applicant will mow one to two times per year and conduct seasonal inspections for invasive or noxious weed management. The Applicant will manage all vegetation in compliance with the AIMA, the Illinois Noxious Weed Law (505 ILCS 100), and Section F.2.a of the Montgomery County Solar Ordinance, using licensed pesticide applicators for any chemical weed control.

USFWS Information for Planning and Consultation (IPaC)

This project occurs within a region that serves as potential habitat for the Endangered Indiana Bat and the Proposed Endangered Tricolored Bat, both of which rely on wooded corridors for roosting and foraging. To eliminate the risk of habitat loss or direct impact on these species, the facility's site plan strictly avoids any clearing of existing trees. Furthermore, by requiring only minimal site work and maintaining existing topography, the project protects the soil integrity of the region and prevents the disruption of local drainage patterns that might affect off-site aquatic habitats (see **Appendix G**).

To promote best practices specific to this region, the project will increase and enhance native vegetation, including polinator plan species which, directly address the conservation needs of the Monarch Butterfly, which is a candidate for federal listing and is known to be present in the area. The integration of native milkweed and nectar-rich forbs into the landscaping will promote a self-sustaining ecosystem that supports local biodiversity while meeting the standards of the Illinois Pollinator-Friendly Solar Site Act.

ForgeSolar Glare Analysis & Visual Impact Assessment

The Applicant conducted a glare analysis using the ForgeSolar Radiometric Physics Engine (v3.1.0). Sensitive potential observers include drivers along E. Clark Street, existing and future residential neighbors to the south and west, and hospital occupants to the southwest.

The Glare Analysis (see **Appendix I**) confirms that the project is not expected to produce any glare (green or yellow) at any receptor. Zero minutes of annual glare were predicted for project across all four airport flight paths, the E. Clark Street route receptor, and all thirteen discrete observation points representing nearby and future residences.

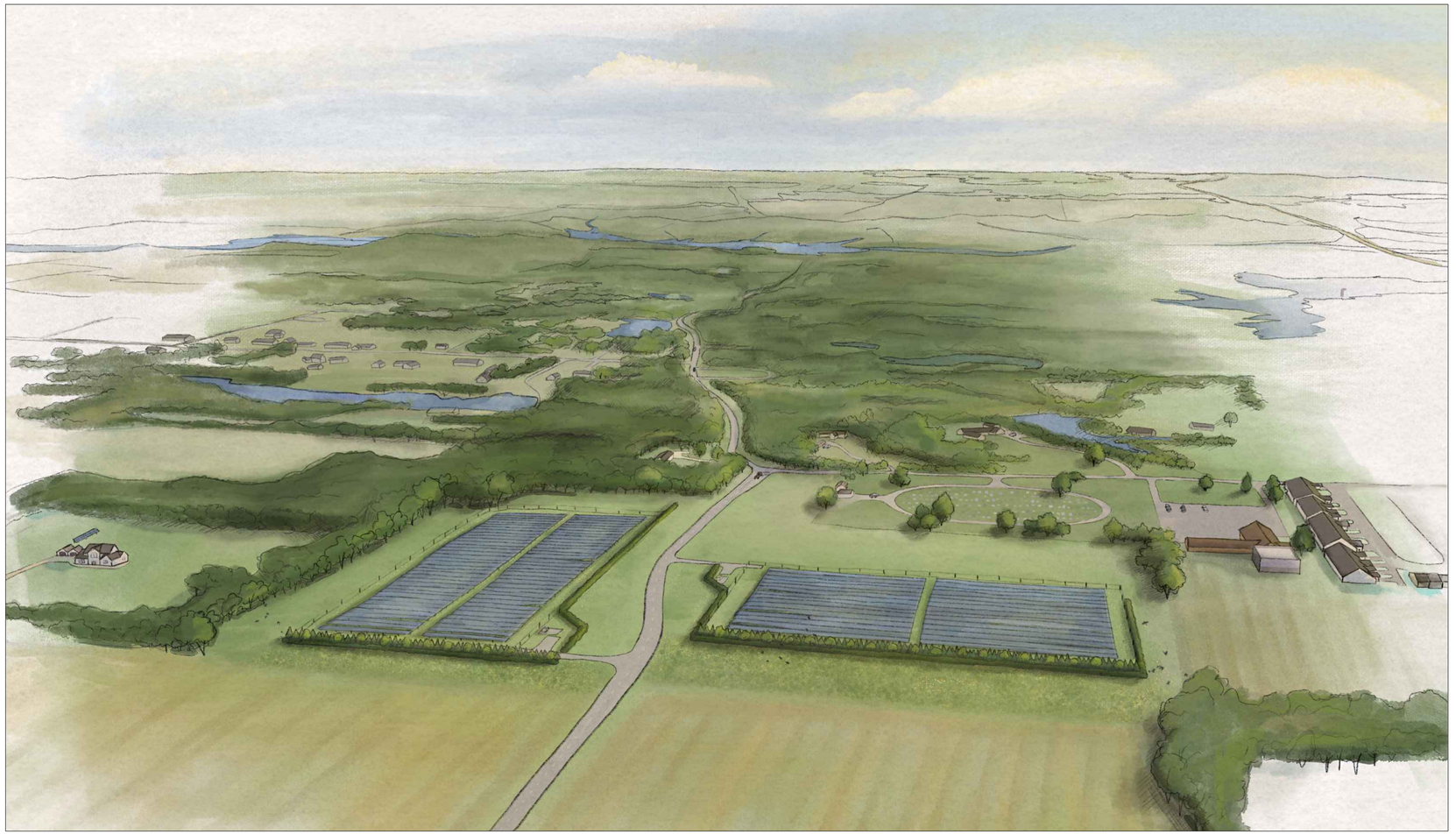
The Applicant also rendered the project into existing-conditions photographs to evaluate the potential for glare or visual impact.

Pages 8 and 9 of this Narrative include renderings of the project site from key vantage points along E. Clark Street. Aspects of the project will be visible from certain locations; however, a combination of native landscape buffering and the 8-foot woven wire perimeter fencing soften the visual impact of the system and contribute positively to the site's character and appearance.

ELM LAWN SOLAR PARK

(2.00 MWAC)

MONTGOMERY COUNTY



ENGINEER:

UNECLIPSED ENERGY, PLLC
2250 Lucien Way, Suite 305,
Maitland, FL 32751 USA

DEVELOPER:

ESA SOLAR ENERGY, LLC
2250 Lucien Way, Suite 305,
Maitland, FL 32751 USA

March 17, 2026

CS_6_2011_Elm Lawn Solar Park_06_26_0316.dwg LAST SAVED BY: Shanvel

REV.	DATE	REVISION DESCRIPTION	DRW	CHK
00	2025-03-07	SITE DEVELOPMENT	MP	GS
01	2025-03-11	PROJECT EXTENDED AS MUCH AS POSSIBLE IN THE NE	MP	GS
02	2025-03-21	PROJECT EXTENDED AS MUCH AS POSSIBLE IN THE NE & S	MP	GS
03	2025-04-04	PV SIZE REDUCED TO 2MAC	DA	MP
04	2026-01-09	PROJECT AREA REVISION	GS	MP
05	2026-03-06	PROJECT AREA REVISION	GS	MP
06	2026-03-17	PROJECT AREA/FENCE/ELEVATION LABELS REVISION	SM	GS

REVISION	DRAWN	CHECKED	APPROVED
06	SM	GS	DC

ENGINEER:	DAVID K, CLICK, PE
IL LIC #:	062.076524
NABCEP PV/PI#:	041704-8

SEAL (PRELIMINARY, UNLESS SEALED)

UNECLIPSED ENERGY, PLLC
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

ESA
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

PROJECT NAME:

ELM LAWN SOLAR PARK
MONTGOMERY COUNTY

ADDRESS	173 YAEGER LAKE TRAIL, LITCHFIELD, IL 62056
COORDINATES	39.184913, -89.634755
SHEET SIZE	24" x 36"

N

SHEET TITLE: COVER SHEET

SHEET No.: G001

TABLE OF CONTENTS

LEGEND OF SYMBOLS

	MODULE RACK	OE	OVERHEAD INTERCONNECTION PATH
	FENCE	UE	UNDERGROUND INTERCONNECTION PATH
	PROPERTY LINE		EXISTING ELECTRICAL LINE
	GRAVEL		UNDERGROUND LINE CLEARANCE
	10FT LANDSCAPING BUFFER B		PUBLIC RIGHT OF WAY
	EXISTING VEGETATION TO REMAIN		PROJECT AREA
	20FT LANDSCAPING BUFFER A		EXISTING OVERHEAD ELECTRICAL POLE
	HABITAT AND POLLINATOR BUFFER		PROPOSED OVERHEAD ELECTRICAL POLE
	LOW GROWTH NATIVE GROUNDCOVER		BUILDING
	STORMWATER BASIN		WETLANDS

GENERAL NOTES

OUR SOLAR FARM WILL INCORPORATE THE FOLLOWING DETAILS:

1. REASONABLE AND APPROPRIATE SCREENING/BUFFERING/LANDSCAPING ACTIVITIES SHALL BE IMPLEMENTED TO SHIELD THE PROJECT FROM ADJOINING AND ADJACENT PARCELS. STRATEGICALLY PLACED TREES, VEGETATION, AND OTHER SCREENING TECHNIQUES SHALL BE USED TO MEET THIS OBJECTIVE. UTILIZING NON-INVASIVE, POLLINATOR-FRIENDLY AND WILDLIFE-FRIENDLY NATIVE PLANTS, SHRUBS, TREES, GRASSES, AND WILDFLOWERS. NATIVE AND POLLINATOR FRIENDLY GROUND COVERS SHALL BE MAINTAINED ON THE PROPERTY UNTIL THE SITE IS DECOMMISSIONED.
2. AN 8-FOOT-HIGH WOVEN FENCE SHALL BE INSTALLED ON THE INTERIOR OF THE VEGETATIVE BUFFER.
3. SETBACKS SHALL BE 50 FEET FROM ALL PUBLIC RIGHTS-OF-WAY AND AT LEAST 150 FEET FROM RESIDENTIAL BUILDINGS ON ADJOINING PARCELS, AND A DISTANCE OF AT LEAST 50 FEET FROM ADJACENT NON-PARTICIPATING PROPERTY LINES.
4. THE PROJECT SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AND REGULATIONS, INCLUDING NEC, ANSI, UL LISTING (OR APPROVED EQUIVALENT), THE INTERNATIONAL BUILDING CODE, THE ILLINOIS STATE ENERGY CODE, AND ALL COUNTY BUILDING CODES IN EFFECT AT THE TIME OF APPLICATION.
5. THE SOLAR PANELS SHALL HAVE TEMPERED, ANTI-GLARE, NON-REFLECTIVE SURFACES.
6. SOLAR ENERGY EQUIPMENT SHALL BE REPAIRED, REPLACED, OR REMOVED WITHIN 365 DAYS OF BECOMING NON-FUNCTIONAL.
7. SOLAR ENERGY COLLECTORS SHALL BE INSTALLED, MAINTAINED, AND USED ONLY IN ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS.
8. THE SOLAR PARK AND INSTALLATION USES SHALL COMPLY WITH CONSTRUCTION CODE, ELECTRICAL CODE, AND OTHER STATE REQUIREMENTS INCLUDING THE AGRICULTURAL IMPACT MITIGATION ACT (505 ILCS 147), APPLICABLE ILLINOIS STATE DRAINAGE LAWS, AND NATURAL RESOURCE REVIEW THROUGH THE IDNR ECOCAT (ECOLOGICAL COMPLIANCE ASSESSMENT TOOL) PROCESS FOR ENDANGERED SPECIES AND WETLANDS.
9. THE PROJECT SHALL COMPLY WITH THE INTERCONNECTION REQUIREMENTS OF THE ELECTRIC UTILITY.
10. THE PROJECT SHALL COMPLY WITH ILLINOIS STORM WATER MANAGEMENT REGULATIONS, EROSION AND SEDIMENT CONTROL PROVISIONS WHERE ADOPTED, AND NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT REQUIREMENTS.
11. THE PROJECT SHALL MEET ALL DEPARTMENT OF TRANSPORTATION REQUIREMENTS WHERE APPLICABLE.

REV	DATE	REVISION DESCRIPTION	DRW	CHK
00	2025-05-07	SITE DEVELOPMENT	MP	GS
01	2025-09-11	PROJECT EXTENDED AS MUCH AS POSSIBLE IN THE NE	MP	GS
02	2025-09-21	PROJECT EXTENDED AS MUCH AS POSSIBLE IN THE NE & S	MP	GS
03	2025-09-24	PV SIZE REDUCED TO 2MAC	CA	GS
04	2026-01-09	PROJECT AREA REVISION	MP	GS
05	2026-03-04	PROJECT AREA REVISION	MP	GS
06	2026-03-17	PROJECT WIDEN EDGE ELEVATION LABELS REVISION	MP	GS

REVISION	DRAWN	CHECKED	APPROVED
06	SM	GS	DC

ENGINEER:	DAVID K, CLICK, PE
IL LIC #:	062.076524
NABCEP PV/PP:	041704-8

SEAL (PRELIMINARY, UNLESS SEALED)

UNECLIPSED ENERGY, PLLC
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

ESA
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

PROJECT NAME:

ELM LAWN SOLAR PARK
MONTGOMERY COUNTY

ADDRESS
173 YAEGER LAKE TRAIL,
LITCHFIELD, IL 62056

COORDINATES
39.184913, -89.634755

SHEET SIZE
24" x 36"

N

SHEET TITLE
GENERAL NOTES

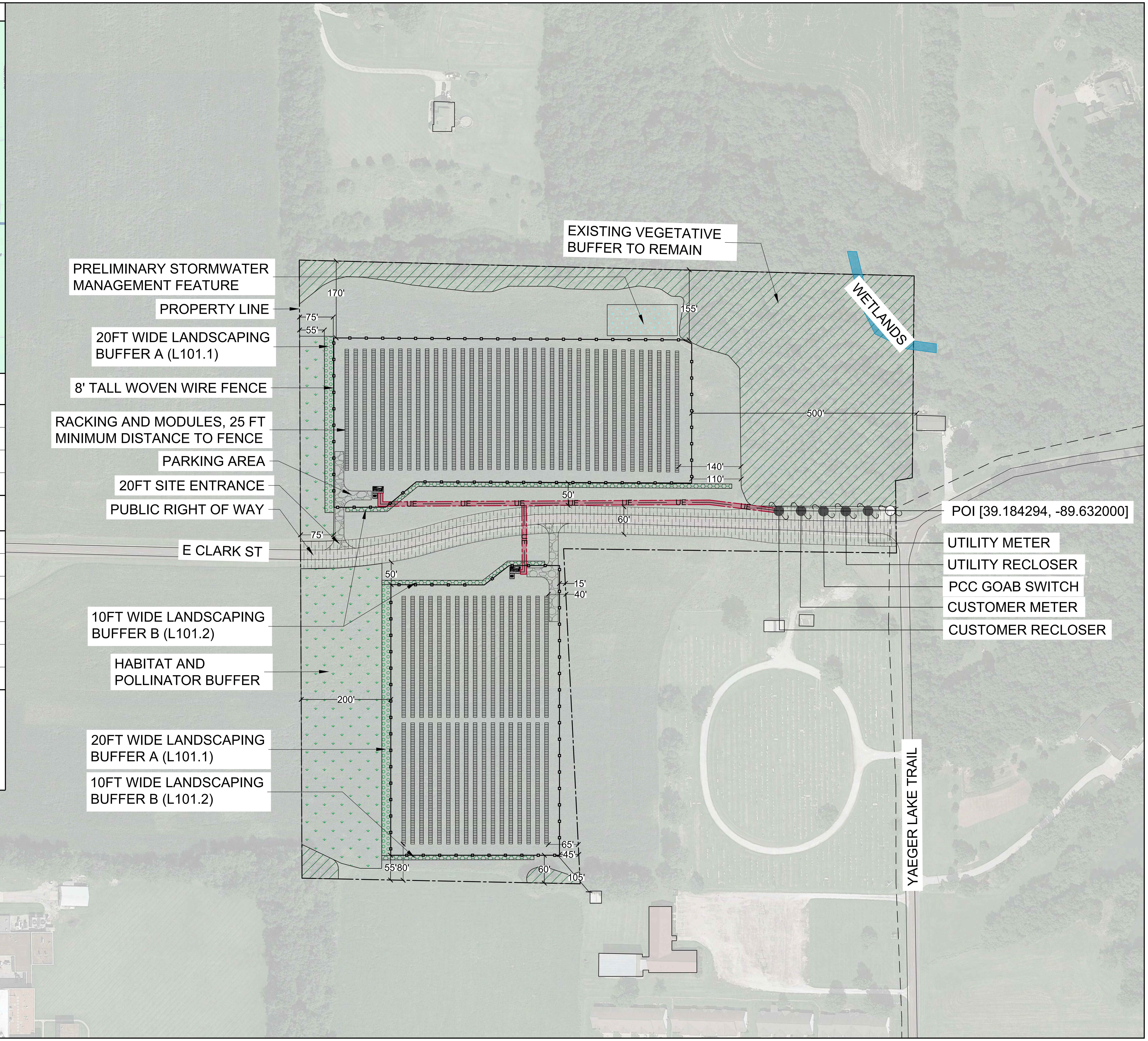
SHEET No.
G002

SUBSTATION: 139423 SCALE: 1"=1500'

PARCEL DATA	
OWNER NAME	Elm Lawn Memorial Park Inc
PARCELID	10-34-100-019
PARCEL AREA	27.42 ACRES
OPERATIONAL AREA	11.51 ACRES

PV DATA	
MODULE COUNT (APPROX.)	5,184
PEAK POWER	2.0 MWAC / 3.0 MWDC
RACKING SYSTEM	SINGLE AXIS TRACKERS
MODULE TILT	+/-55 DEGREES
MODULE ORIENTATION	EAST/WEST (AZ. 90°/270°)
MODULE HEIGHT (MAX TILT)	~10 FT
BASIS OF DESIGN	QCELLS Q.PEAK DUO XL-G11S.3 / BFG 600W

This site plan is preliminary and NOT FOR CONSTRUCTION, awaiting surveys as well as zoning. Layout is based on GIS information, and is subject to survey.



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04	2026-01-30	PROJECT AREA REVISION	GS	MP
05	2026-03-06	PROJECT AREA REVISION	GS	MP
06	2026-03-17	PROJECT AREA/FENCE/ELEVATION LABELS REVISION	SM	GS

REVISION	DRAWN	CHECKED	APPROVED
06	SM	GS	DC

ENGINEER:	DAVID K, CLICK, PE
IL LIC #:	062.076524
NABCEP PVIP#:	041704-8

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PRELIMINARY

UNECLIPSED ENERGY
UNECLIPSED ENERGY, PLLC
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

esa
ESA
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

PROJECT NAME:

ELM LAWN SOLAR PARK
MONTGOMERY COUNTY

ADDRESS
173 YAEGER LAKE TRAIL,
LITCHFIELD, IL 62056

COORDINATES
39.184913, -89.634755

SHEET SIZE
24" x 36"

SCALE: 1" = 105'
0 25' 50' 100'

N

SHEET TITLE: SITE PLAN

SHEET No. G101

CS_IL_0011_Elm Lawn Solar Park_06_26_0316.dwg LAST SAVED BY: Shanuel

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06	2026-03-17	PROJECT AREA/FENCE/ELEVATION LABELS REVISION	SM	GS

REVISION	DRAWN	CHECKED	APPROVED
06	SM	GS	DC

ENGINEER:	DAVID K, CLICK, PE
IL LIC #:	062.076524
NABCEP PVIP#:	041704-8

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UNECLIPSED ENERGY
UNECLIPSED ENERGY, PLLC
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

ESA
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

PROJECT NAME:

ELM LAWN SOLAR PARK
MONTGOMERY COUNTY

ADDRESS
173 YAEGER LAKE TRAIL,
LITCHFIELD, IL 62056

COORDINATES
39.184913, -89.634755

SHEET SIZE
24" x 36"

SCALE: 1" = 100'
0 25' 50' 100'

N

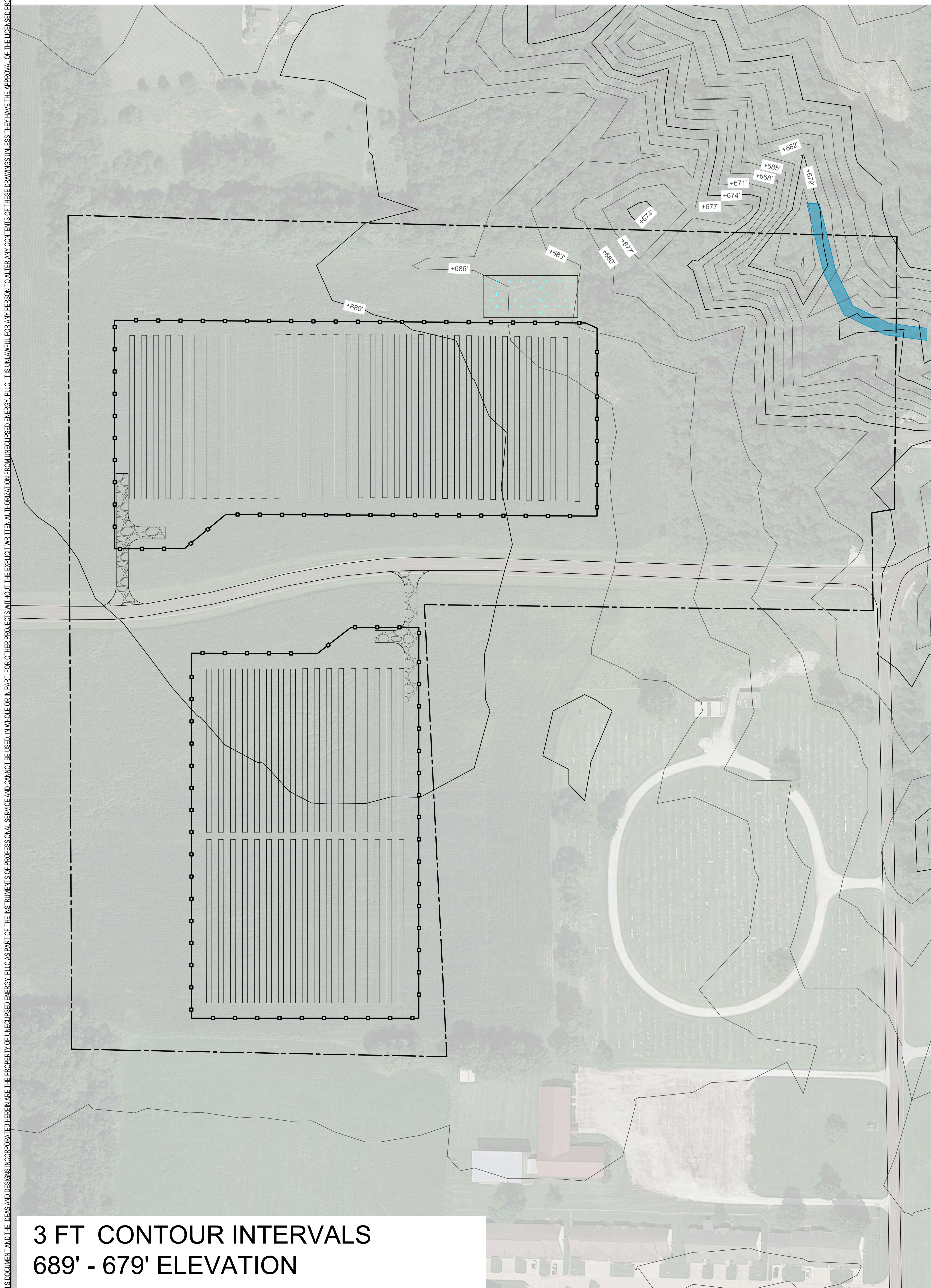
SHEET TITLE
PROJECT AREA PLAN

SHEET No.
G102

CS_IL_0011_Elm Lawn Solar Park_06_26_0316.dwg LAST SAVED BY: Shanuel

C101.1 CONTOUR AND WETLANDS PLAN

SCALE: 0' - 1" = 100' - 0"

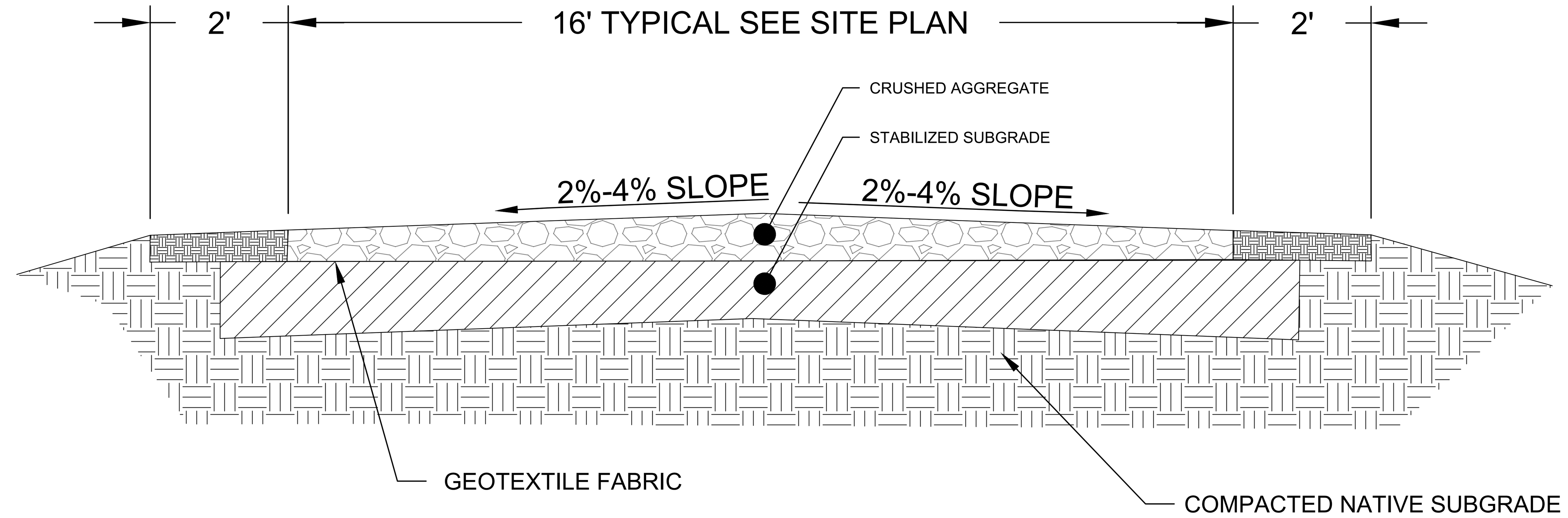


3 FT CONTOUR INTERVALS

689' - 679' ELEVATION

C101.2 CROWNED ACCESS ROAD SECTION DETAIL

SCALE: 0' - 1" = 1' - 5"



C102.3 SLOPED ACCESS ROAD SECTION DETAIL

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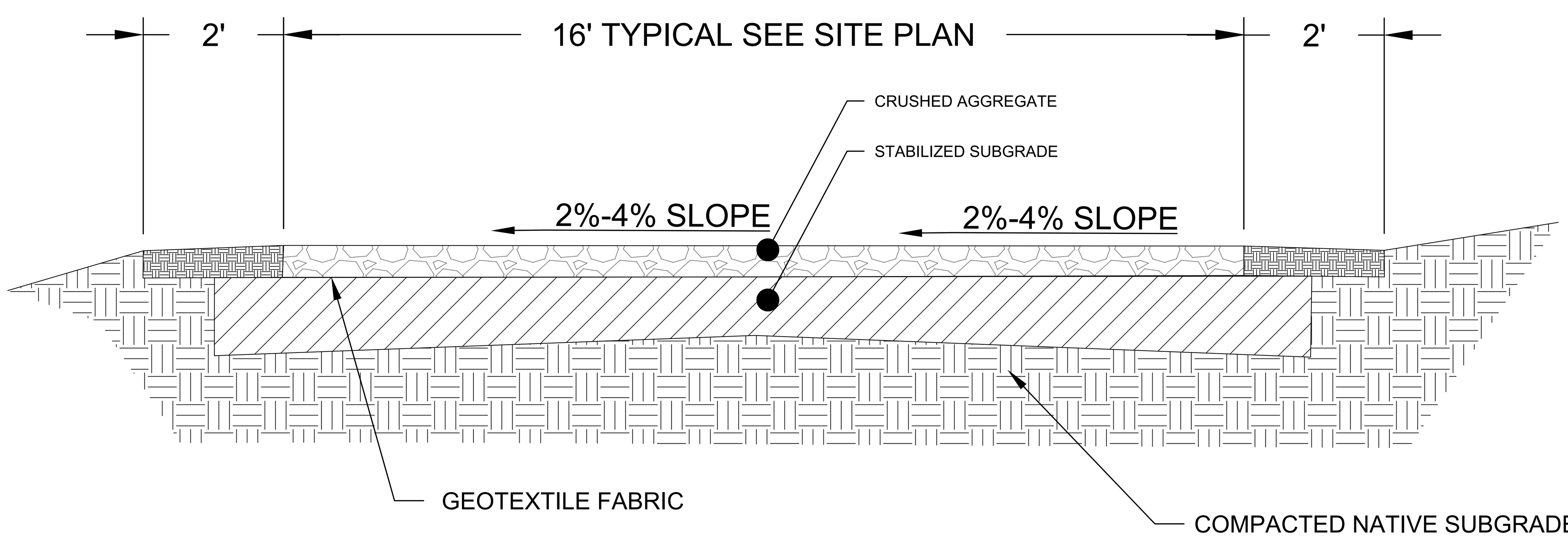

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05	2026-03-06	PROJECT AREA REVISION	GS	MP
06	2026-03-17	PROJECT AREA/FENCE/ELEVATION LABELS REVISION	SM	GS

REVISION	DRAWN	CHECKED	APPROVED
06	SM	GS	DC

ENGINEER:	DAVID K, CLICK, PE
IL LIC #:	062.076524
NABCEP PVIP#:	041704-8

SEAL (PRELIMINARY, UNLESS SEALED)

UNECLIPSED ENERGY

UNECLIPSED ENERGY, PLLC
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

esa

ESA
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

PROJECT NAME:

ELM LAWN SOLAR PARK
MONTGOMERY COUNTY

ADDRESS
173 YAEGER LAKE TRAIL,
LITCHFIELD, IL 62056

COORDINATES
39.184913, -89.634755

SHEET SIZE
24" x 36"

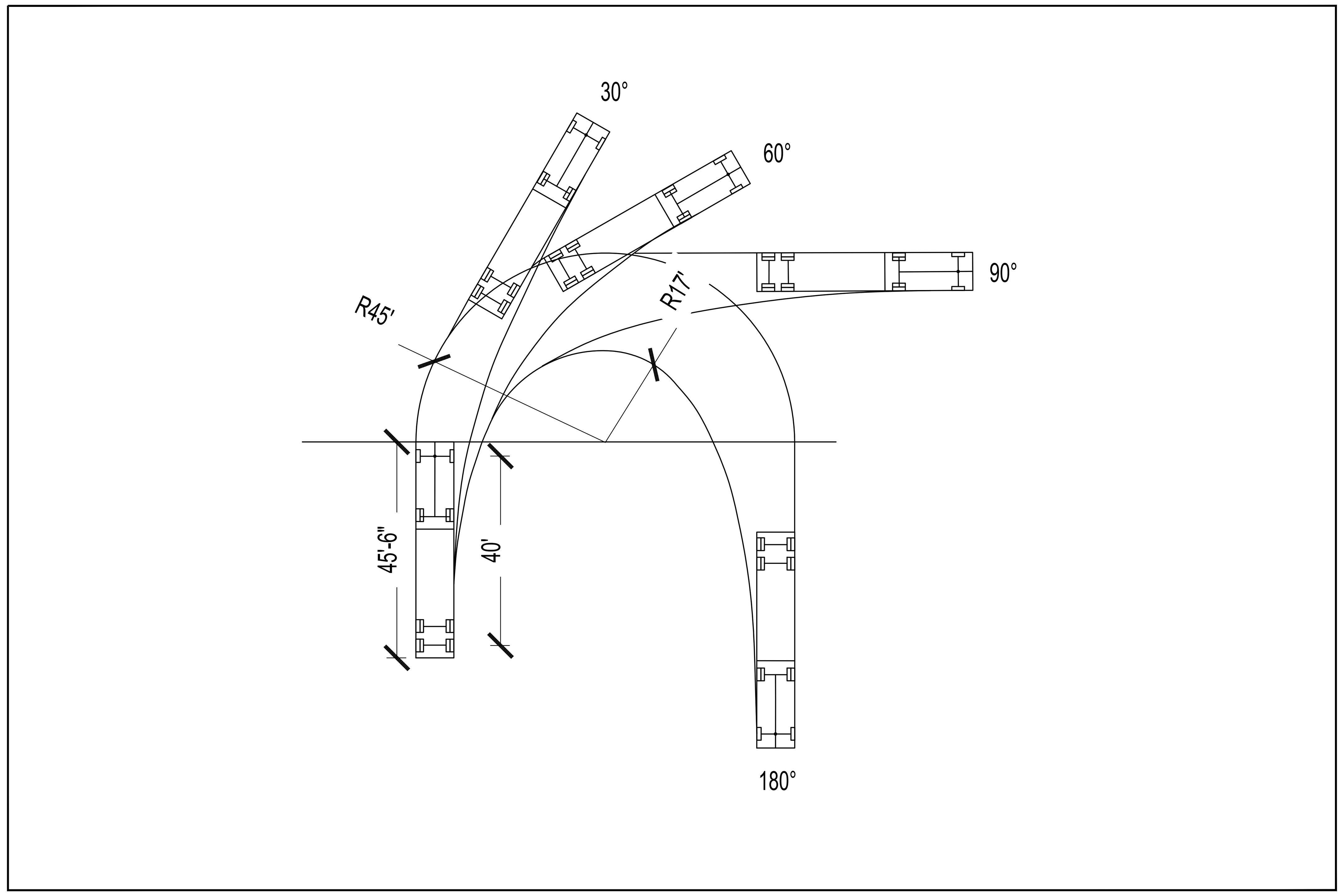
SCALE: 1" = 100'
0 25' 50' 100'

N

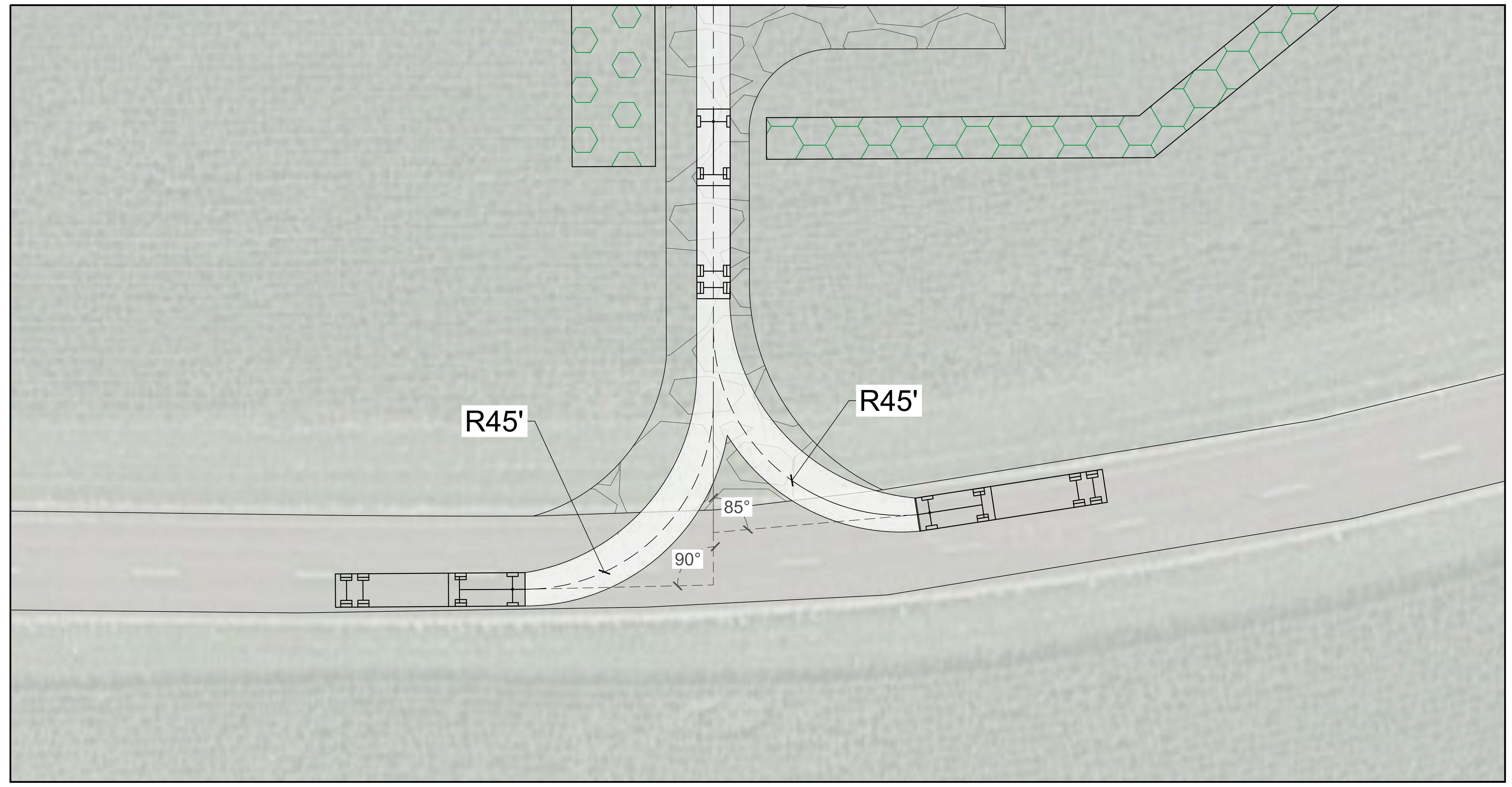
SHEET TITLE:
CONTOUR MAP

SHEET No.
C101

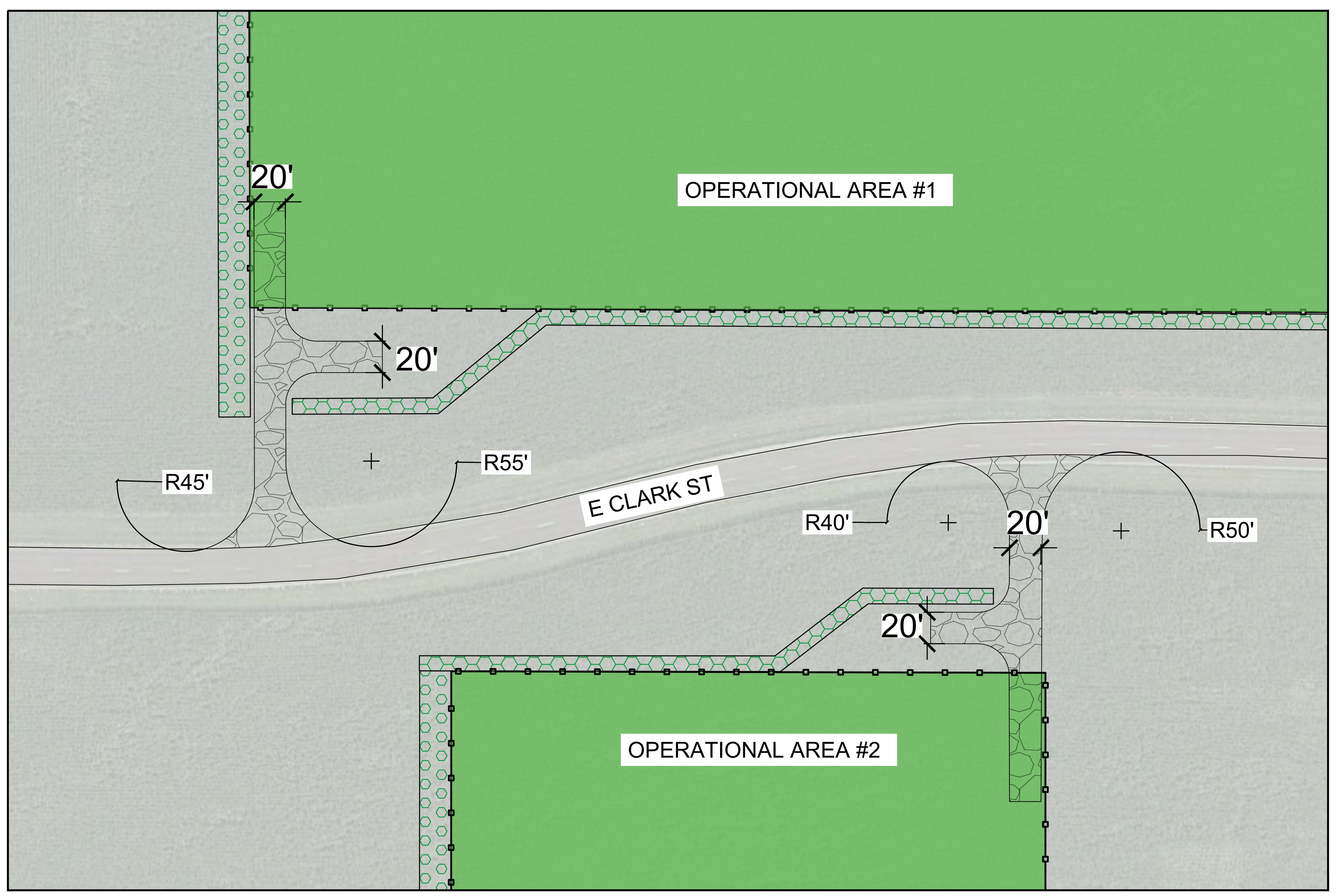
STANDARD SEMI-TRAILER TRUCK TURNING PATH
SCALE: 1"=20'



PRELIMINARY "ENTERING" SEMI-TRAILER TRUCK TURNING PATH
SCALE: 1"=20'



DRIVEWAY DIMENSIONS
SCALE: 1"=60'



PRELIMINARY "EXIT" SEMI-TRAILER TRUCK TURNING PATH
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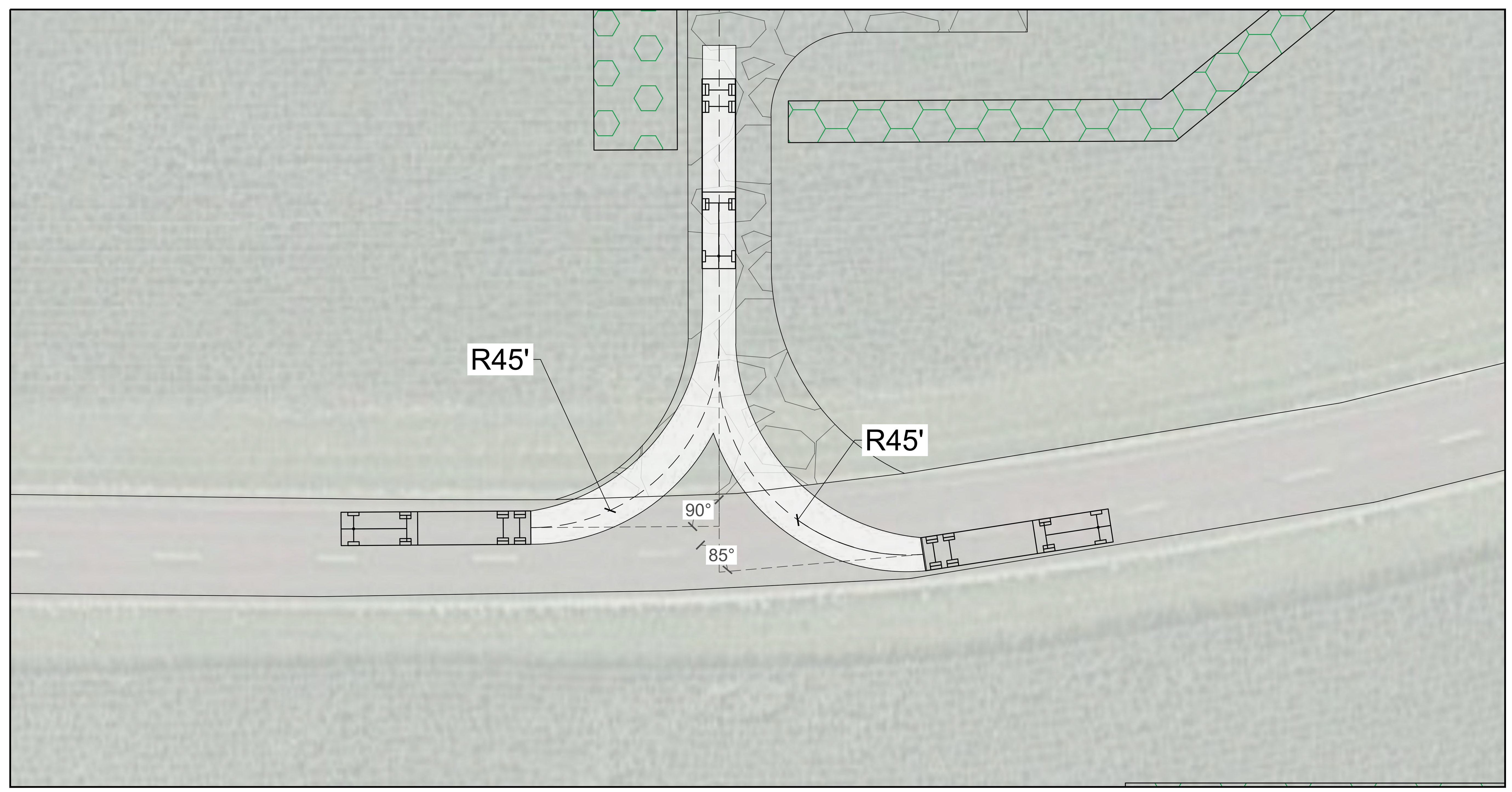

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05	2026-03-06	PROJECT AREA REVISION	GS	MP
06	2026-03-17	PROJECT AREA/FENCE/ELEVATION LABELS REVISION	SM	GS

REVISION	DRAWN	CHECKED	APPROVED
06	SM	GS	DC

ENGINEER:	DAVID K, CLICK, PE
IL LIC #:	062.076524
NABCEP PVIP#:	041704-8

SEAL (PRELIMINARY, UNLESS SEALED)

UNECLIPSED ENERGY
UNECLIPSED ENERGY, PLLC
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

esa
ESA
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

PROJECT NAME:

ELM LAWN SOLAR PARK
MONTGOMERY COUNTY

ADDRESS
173 YAEGER LAKE TRAIL,
LITCHFIELD, IL 62056

COORDINATES
39.184913, -89.634755

SHEET SIZE
24" x 36"

SCALE: 1" = 100'
0 25' 50' 100'

N

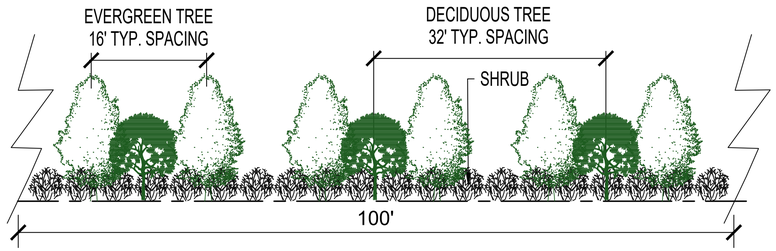
SHEET TITLE
TRAFFIC TURNING PLAN

SHEET No.
C103

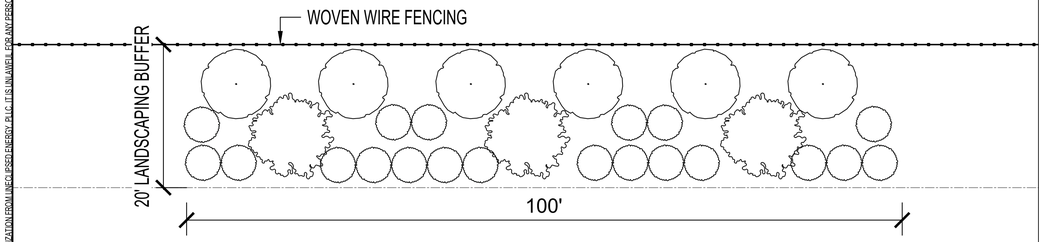
CS_IL_0011_Elm Lawn Solar Park_06_26_0316.dwg
LAST SAVED BY: Shanuel

L101.1 :BUFFER OPTION A

LANDSCAPE ELEVATION — SCALE: 1"=10'



LANDSCAPE PLAN — SCALE: 1"=10'

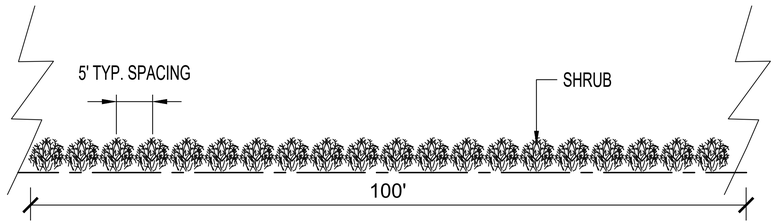


"Per one hundred (100) linear feet"

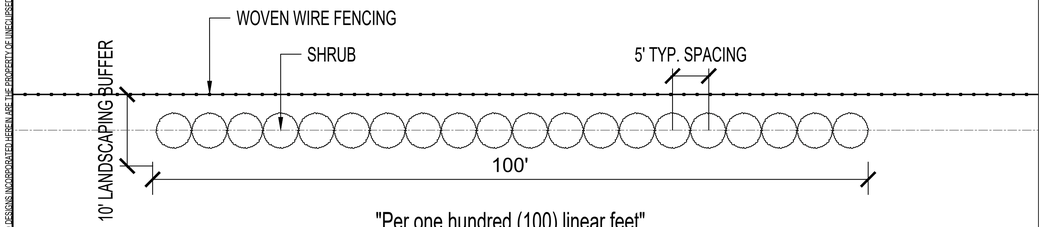
- 6 Evergreen Trees
- 3 Deciduous Trees
- 20 Shrubs
- Vegetative Groundcover

L101.2 :BUFFER OPTION B

LANDSCAPE ELEVATION — SCALE: 1"=10'



LANDSCAPE PLAN — SCALE: 1"=10'

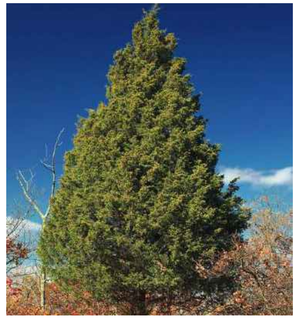


"Per one hundred (100) linear feet"

- 20 Shrubs
- Vegetative Groundcover

L101.3 :LANDSCAPE BUFFER SCHEDULE

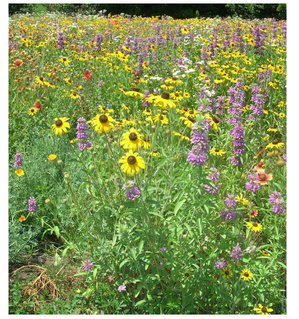
LANDSCAPING BUFFER WILL USE A VARIETY OF NATIVE SPECIES WITH EXISTING VEGETATION USED WHERE POSSIBLE. NATIVE POLLINATOR FRIENDLY VEGETATION WILL BE USED. SPECIES AND SEED MIXES LISTED ARE ILLUSTRATIVE EXAMPLES AND MAY BE SUBJECT TO CHANGE BASED ON REVIEW FROM SUPPLIERS ON FEASIBILITY AND AVAILABILITY.



EVERGREEN TREE:
EASTERN RED CEDAR OR EASTERN WHITE PINE

DECIDUOUS TREE:
IRONWOOD TREE, EASTERN REDBUD, RED OAK OR HEDGE MAPLE

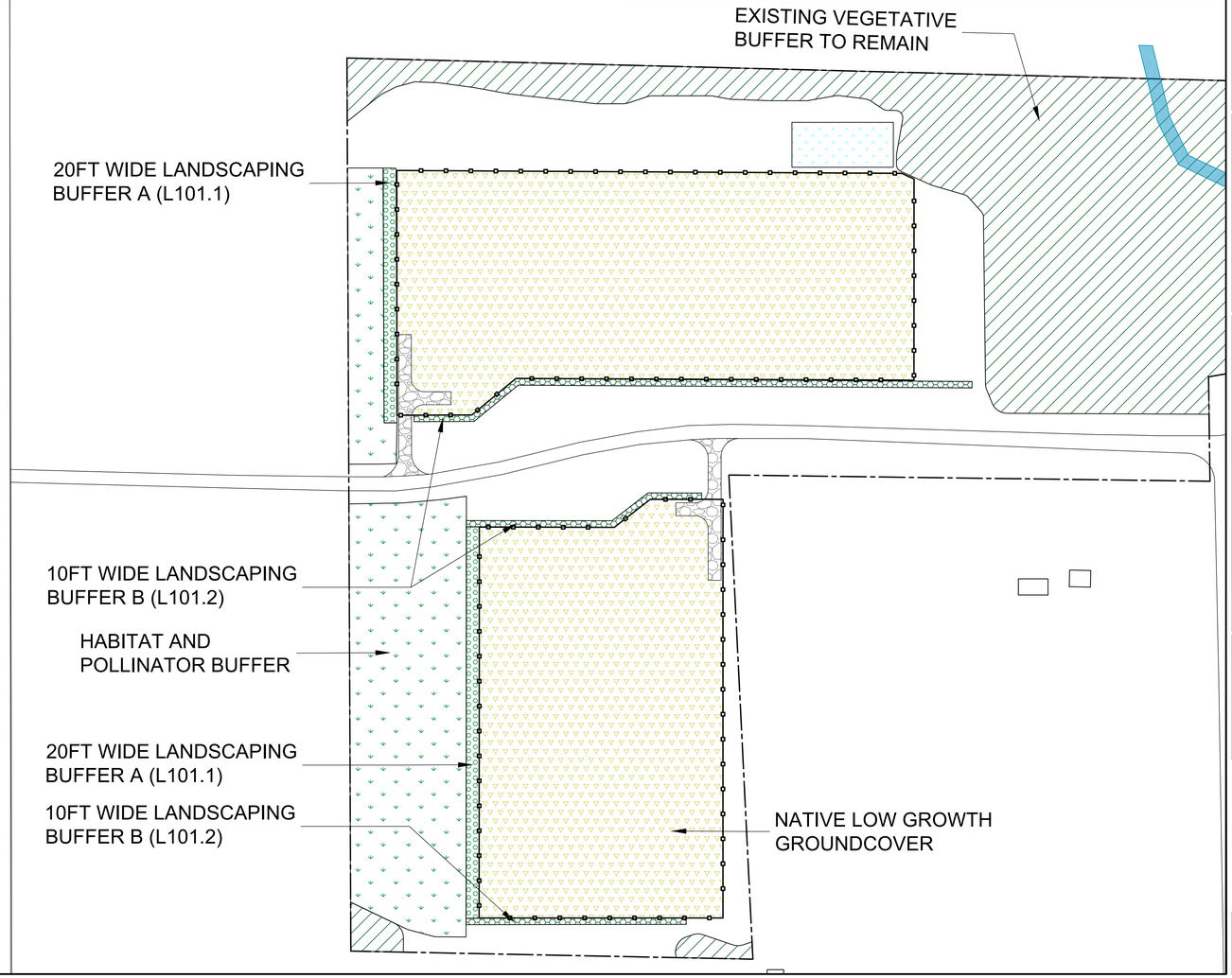
SHRUB:
RED OSIER DOGWOOD, CHOKEBERRY, SWEET GALE, SNOWBERRY OR BLACKHAW VIBURNUM



POLLINATOR/HABITAT GROUNDCOVER:
MONARDA, BUTTERFLY MILKWEED, PURPLE CONEFLOWER, RUDBECKIA AND GOLDENROD

L101.4 :LANDSCAPING PLAN

SCALE: 1"=105'



REV	DATE	REVISION DESCRIPTION	DRW	CHK
00	2025-03-07	SITE DEVELOPMENT	MP	GS
01	2025-09-11	PROJECT EXTENDED AS MUCH AS POSSIBLE IN THE NE	MP	GS
02	2025-09-21	PROJECT EXTENDED AS MUCH AS POSSIBLE IN THE NE & S	MP	GS
03	2025-09-24	PV SIZE REDUCED TO 2MAC	CS	GS
04	2026-01-09	PROJECT AREA REVISION	MP	GS
05	2026-03-04	PROJECT AREA REVISION	MP	GS
06	2026-03-17	PROJECT AREA/FENCE/ELEVATION LABELS REVISION	MP	GS

REVISION	DRAWN	CHECKED	APPROVED
06	SM	GS	DC

ENGINEER: DAVID K, CLICK, PE
IL LIC #: 062.076524
NABCEP PV/PP: 041704-8

SEAL (PRELIMINARY, UNLESS SEALED)

UNECLIPSED ENERGY, PLLC
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

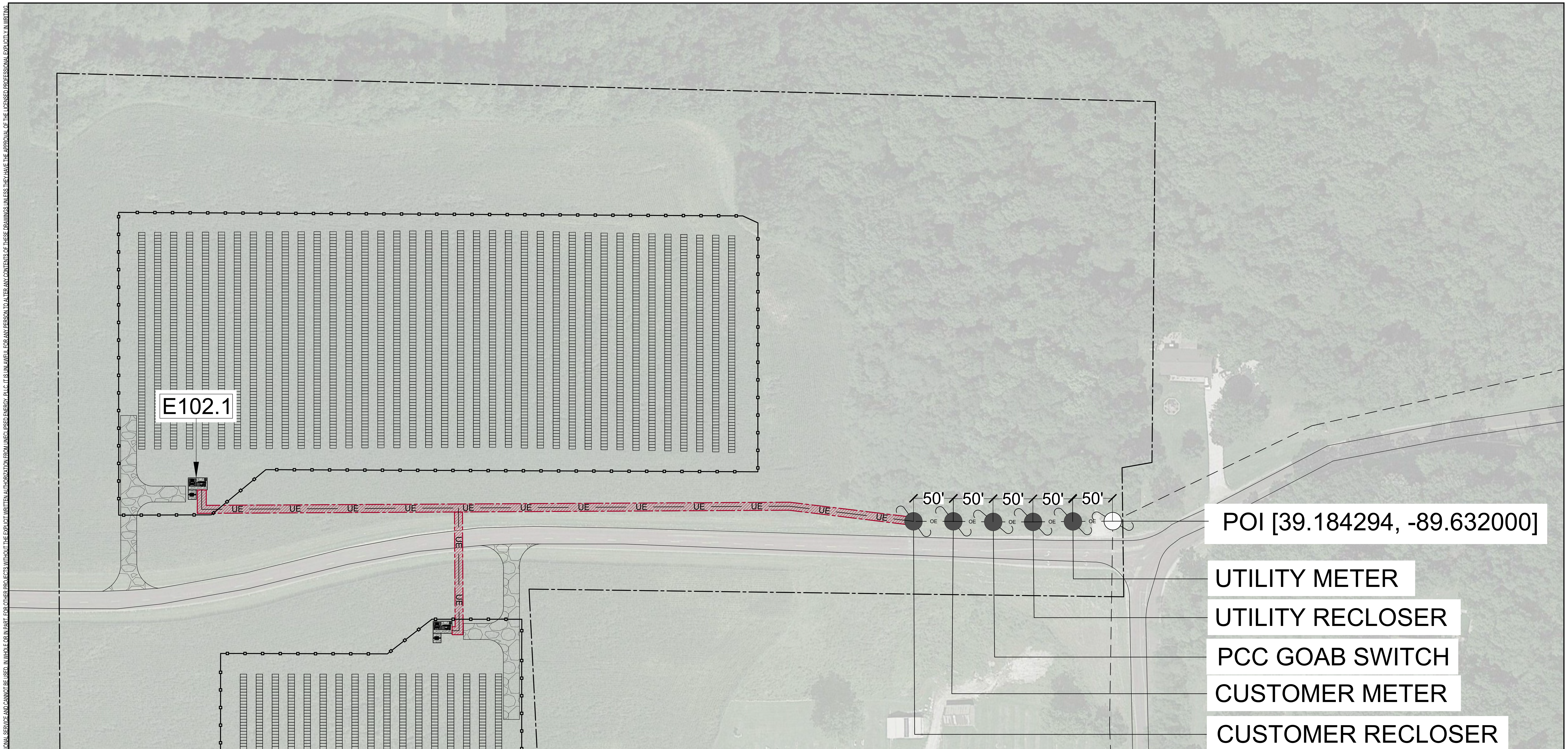
ESA
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

PROJECT NAME:
ELM LAWN SOLAR PARK
MONTGOMERY COUNTY

ADDRESS
173 YAEGER LAKE TRAIL,
LITCHFIELD, IL 62056
COORDINATES
39.184913, -89.634755
SHEET SIZE
24" x 36"

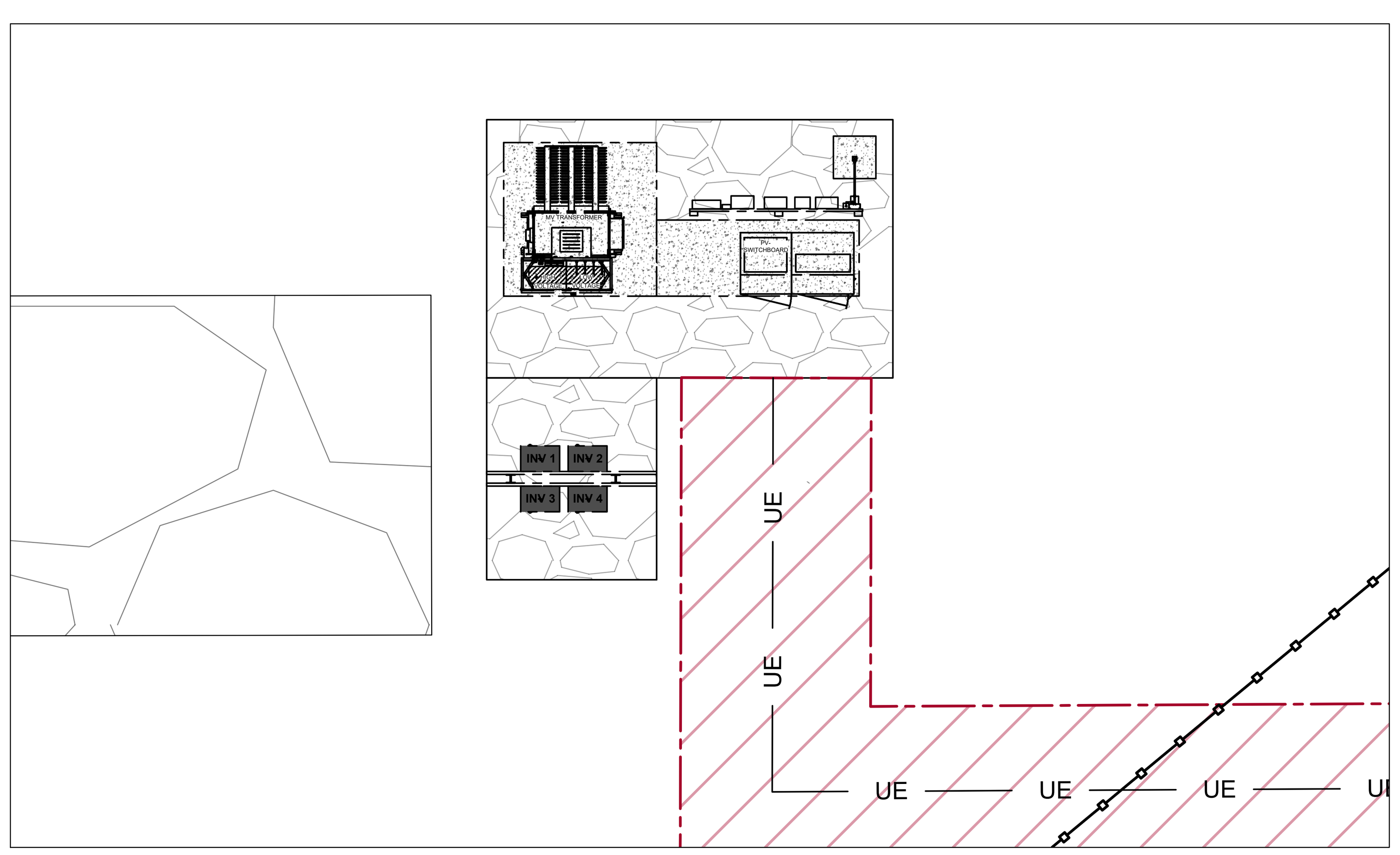
SHEET TITLE
LANDSCAPING PLAN
SHEET No.
L101

CS_IL-2011_Elm Lawn Solar Park_06_26_0318.dwg LAST SAVED BY: Shamel



E102.1 INVERTER PAD DETAIL

SCALE: 1"=8'



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01	2025-03-11	PROJECT EXTENDED AS MUCH AS POSSIBLE IN THE NE	MP	GS
02	2025-03-21	PROJECT EXTENDED AS MUCH AS POSSIBLE IN THE NE & S	MP	GS
03	2025-06-04	PV SIZE REDUCED TO 2MAC	GS	MP
04	2026-01-30	PROJECT AREA REVISION	GS	MP
05	2026-03-06	PROJECT AREA REVISION	GS	MP
06	2026-03-17	PROJECT AREA/FENCE/ELEVATION LABELS REVISION	SM	GS

REVISION	DRAWN	CHECKED	APPROVED
06	SM	GS	DC

ENGINEER:	DAVID K, CLICK, PE
IL LIC #:	062.076524
NABCEP PVIP#:	041704-8

SEAL (PRELIMINARY, UNLESS SEALED)

UNECLIPSED ENERGY

UNECLIPSED ENERGY, PLLC
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

esa

ESA
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

PROJECT NAME:

ELM LAWN SOLAR PARK
MONTGOMERY COUNTY

ADDRESS
173 YAEGER LAKE TRAIL,
LITCHFIELD, IL 62056

COORDINATES
39.184913, -89.634755

SHEET SIZE
24" x 36"

SCALE: 1" = 60'
0 15' 30' 60'

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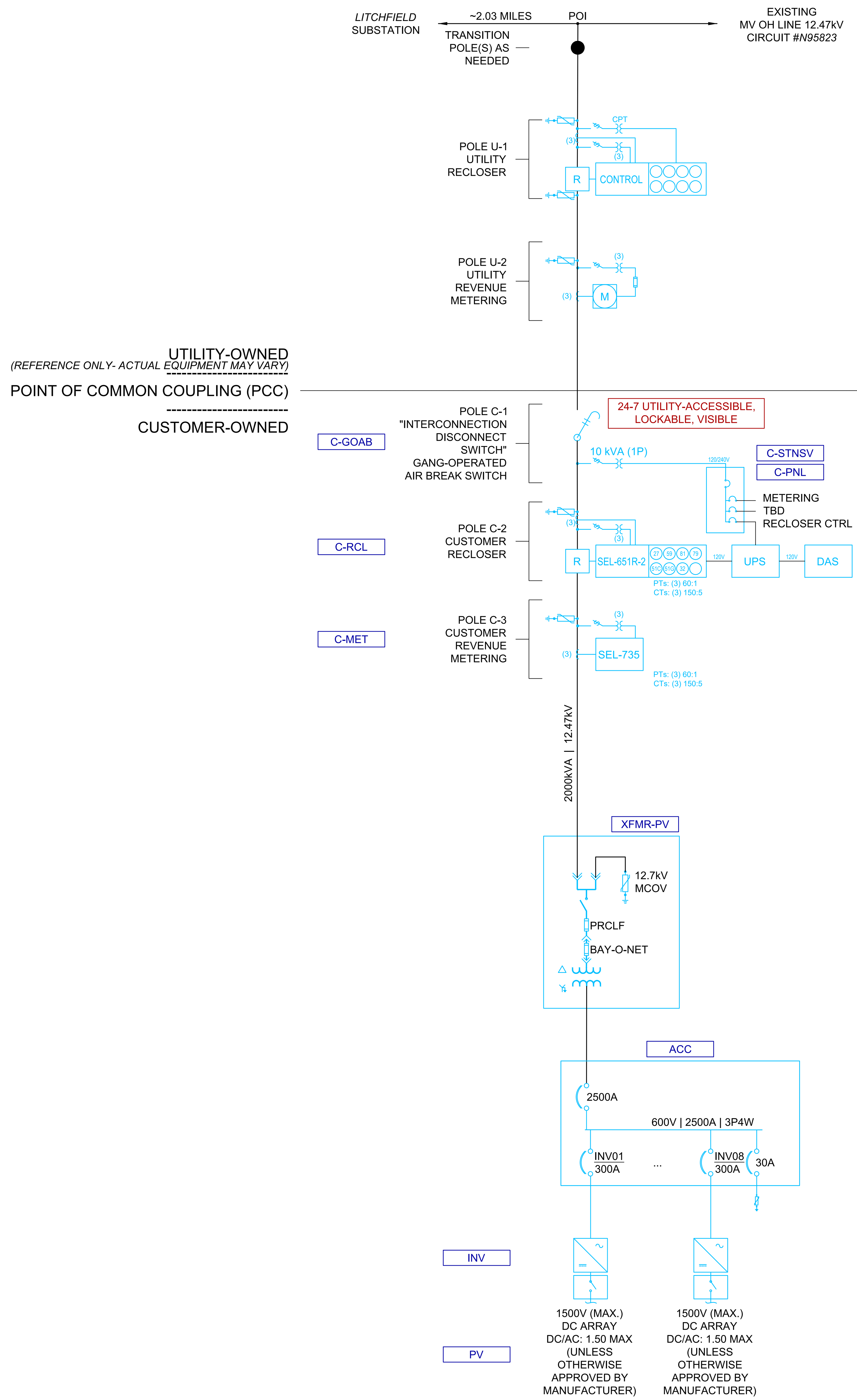
SHEET TITLE
ELECTRICAL PLAN

SHEET No.
E101



PHOTOVOLTAIC SYSTEM - EQUIPMENT SCHEDULE

TAG	QTY	MANUFACTURER	MODEL	DESCRIPTION
PV	2MW~	TIER 1 MANUFACTURER	TBD	UTILITY COMMERCIAL PHOTOVOLTAIC MODULE 1500V RATED, LISTED TO UL1703, IEC 61730
INV	8	YASKAWA AMERICA, INC.	XG 1500-250/250-600	PV INVERTER 250 KVA, 250 KW, 600Vac, LISTED/CERTIFIED TO UL1741SB, IEEE 1547, UL1998, UL1699B
ACC	1	EPEC SOLUTIONS, INC./OAE	TBD	SWITCHBOARD, 600/347V, 2500A MAIN, 2500A MIN. BUSBAR, NEMA 3R, BREAKERS OR FUSES-SWITCHES
XFMR-PV	1	COOPER/OAE	3P PADMOUNT	[illegible]KVA PADMOUNTED TRANSFORMER, PRIMARY: 12.47/7.2KV WYE-GND, SECONDARY 600/347V WYE-GND, Z=[illegible]%, PRIMARY TAPS AT +-2.5% AND +-5.0%, LOOP FEED, FR3
C-MET	1	SCHWEITZER/OAE	SEL-735	SEL-735 W/ PTs, CTs, TEST SWITCHES, INTEGRATED INTO CUSTOMER DATA ACQ. SYSTEM
C-RCL	1	G&W/OAE	VIPER	15.5KV VIPER-S THREE-PHASE RECLOSER, 800A, 12.5KA RMS, 110KV BIL, WITH SEL-651R-2 CONTROL
C-GOAB	1	COOPER/OAE	M-FORCE 3P SWITCH - [illegible]	15.5kV THREE-PHASE GANG-OPERATED SWITCH, 900A, 25kA RMS, 110kV BIL
C-STNSV	1	TBD	TBD	50A 120/240V 1PH STATION SERVICE SUPPLYING ANCILLARY LOADS
C-PNL	1	TBD	TBD	PANELBOARD, 50A 1PH, NEMA 3R

PROPOSED SEL-651R RELAY SETTINGS (V_{NOM} = 7.200kV L-G)

ANSI#	PRIMARY PICKUP		CLEARING TIME
27-1	50%	3600 V	0.16 SEC
27-2	88%	6336 V	1.00 SEC
59-1	107%	7704 V	1.00 SEC
59-2	120%	8640 V	0.02 SEC
81U-1	57.0 Hz	-	0.16 SEC
81U-2	59.3 Hz	-	300 SEC
81O-1	60.5 Hz	-	0.16 SEC
81O-2	-	-	-
51P/Q/G	TBD	-	TBD
51C	TBD	-	TBD
51CG	TBD	-	TBD
67	TBD	-	TBD

PROPOSED SOLAR INVERTER SETTINGS (V_{NOM} = 0.600kV L-L)

ANSI#	PRIMARY PICKUP		CLEARING TIME
27-1	50%	300 V	0.16 SEC
27-2	88%	528 V	1.00 SEC
59-1	107%	642 V	1.00 SEC
59-2	120%	720 V	0.02 SEC
81U-1	57.0 Hz	-	0.16 SEC
81U-2	59.3 Hz	-	300 SEC
81O-1	60.5 Hz	-	0.16 SEC
81O-2	-	-	-

David Click

Digitally signed by David Click
Date: 2025.06.04 15:08:43 -04'00'

REVISION	DRAWN	CHECKED	APPROVED
06	SM	GS	DC

ENGINEER: DAVID K. CLICK, PE
IL LIC #: 062.076524
NABCEP PVIP#: 041704-8

SEAL (PRELIMINARY, UNLESS SEALED)
LICENSED PROFESSIONAL ENGINEER
DAVID K. CLICK
062.076524
OF ILLINOIS

UNECLIPSED ENERGY
UNECLIPSED ENERGY, PLLC
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

esa
ESA
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

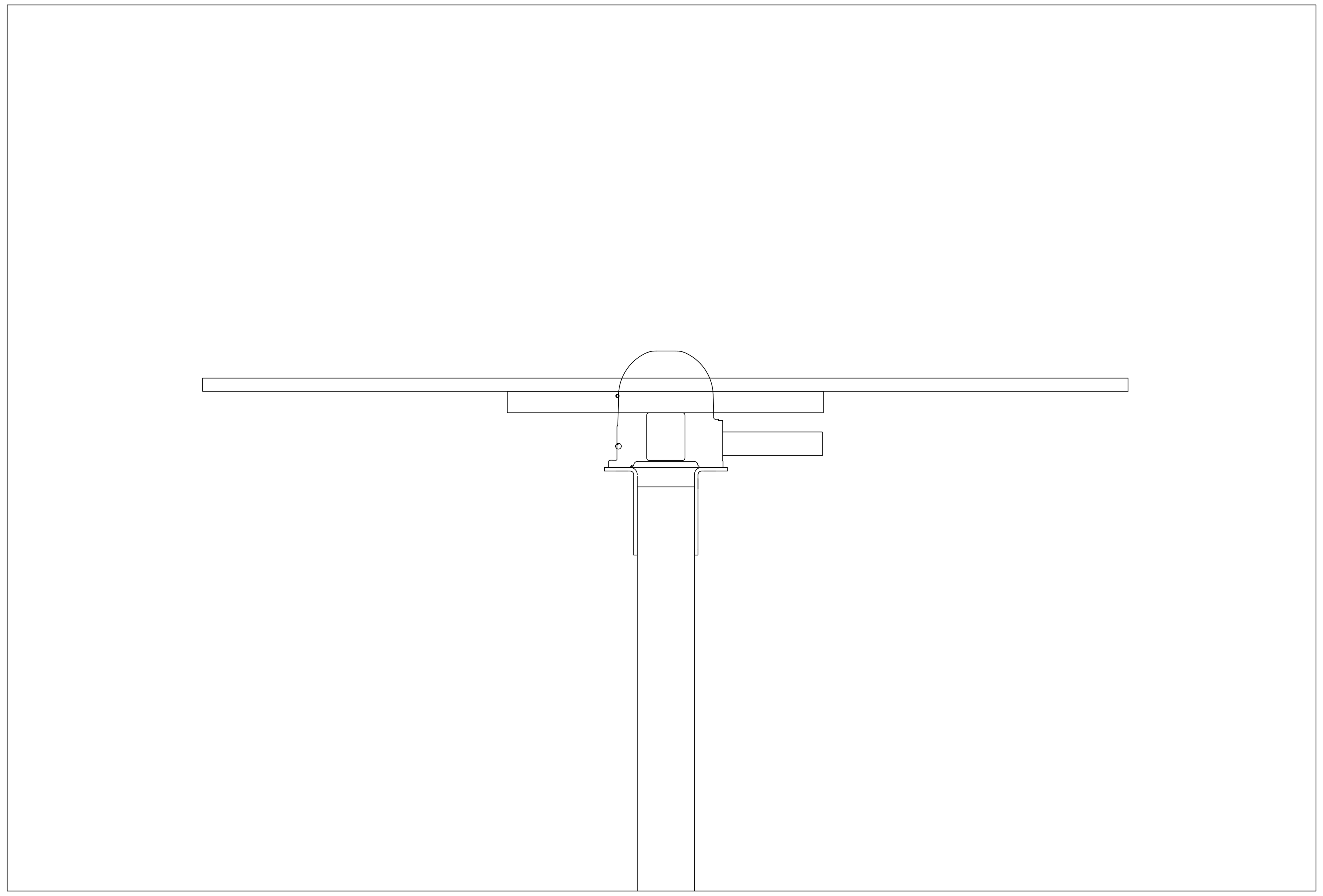
PROJECT NAME:
ELM LAWN SOLAR PARK
MONTGOMERY COUNTY

ADDRESS
173 YAEGER LAKE TRAIL, LITCHFIELD, IL 62056
COORDINATES
39.184913, -89.634755
SHEET SIZE
24" x 36"

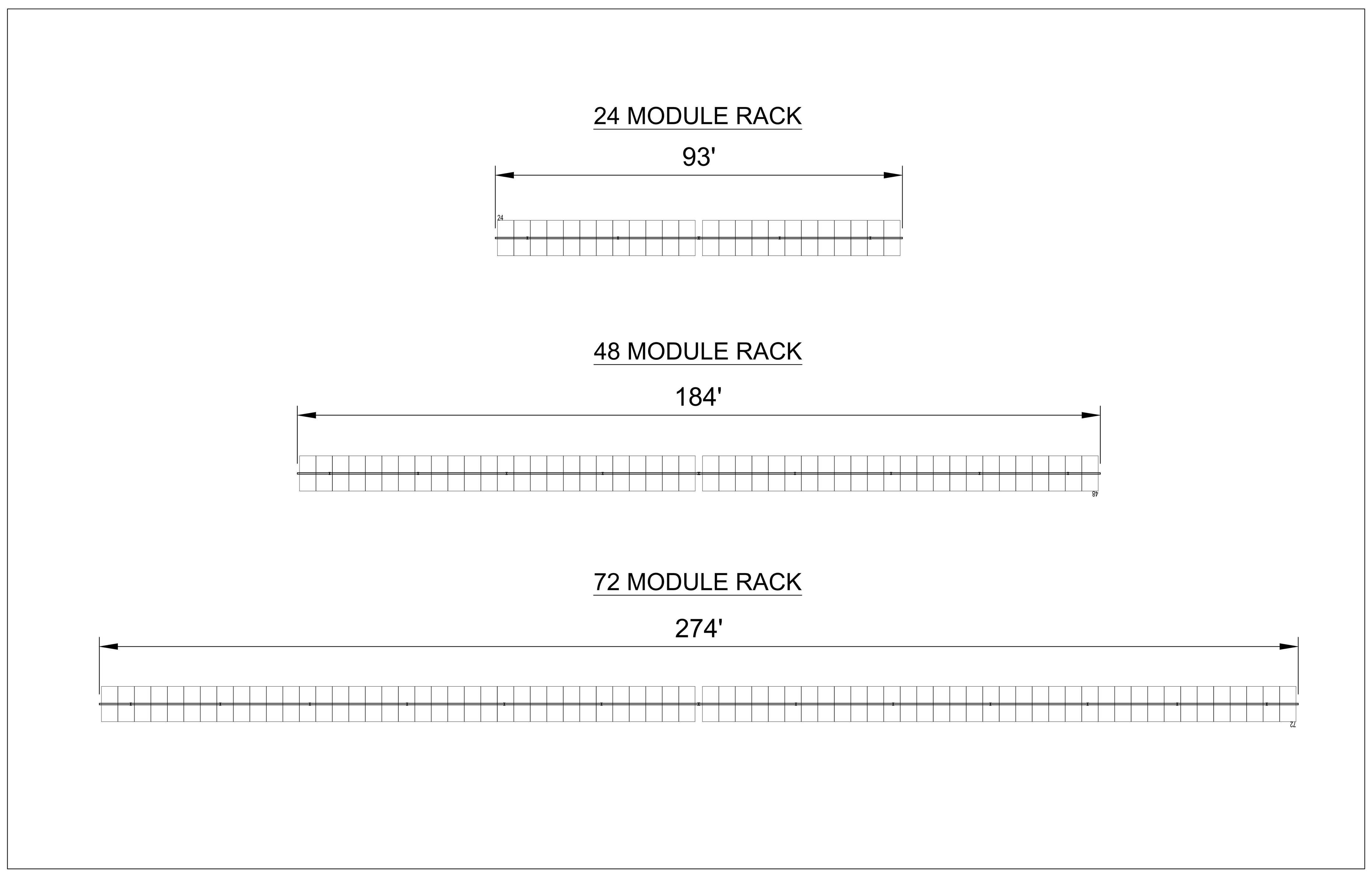
N

SHEET TITLE
SINGLE LINE DIAGRAM
SHEET No.
E102

Q501.1: AXIS BLOWUP



Q501.2: TYPICAL RACKING WIDTH



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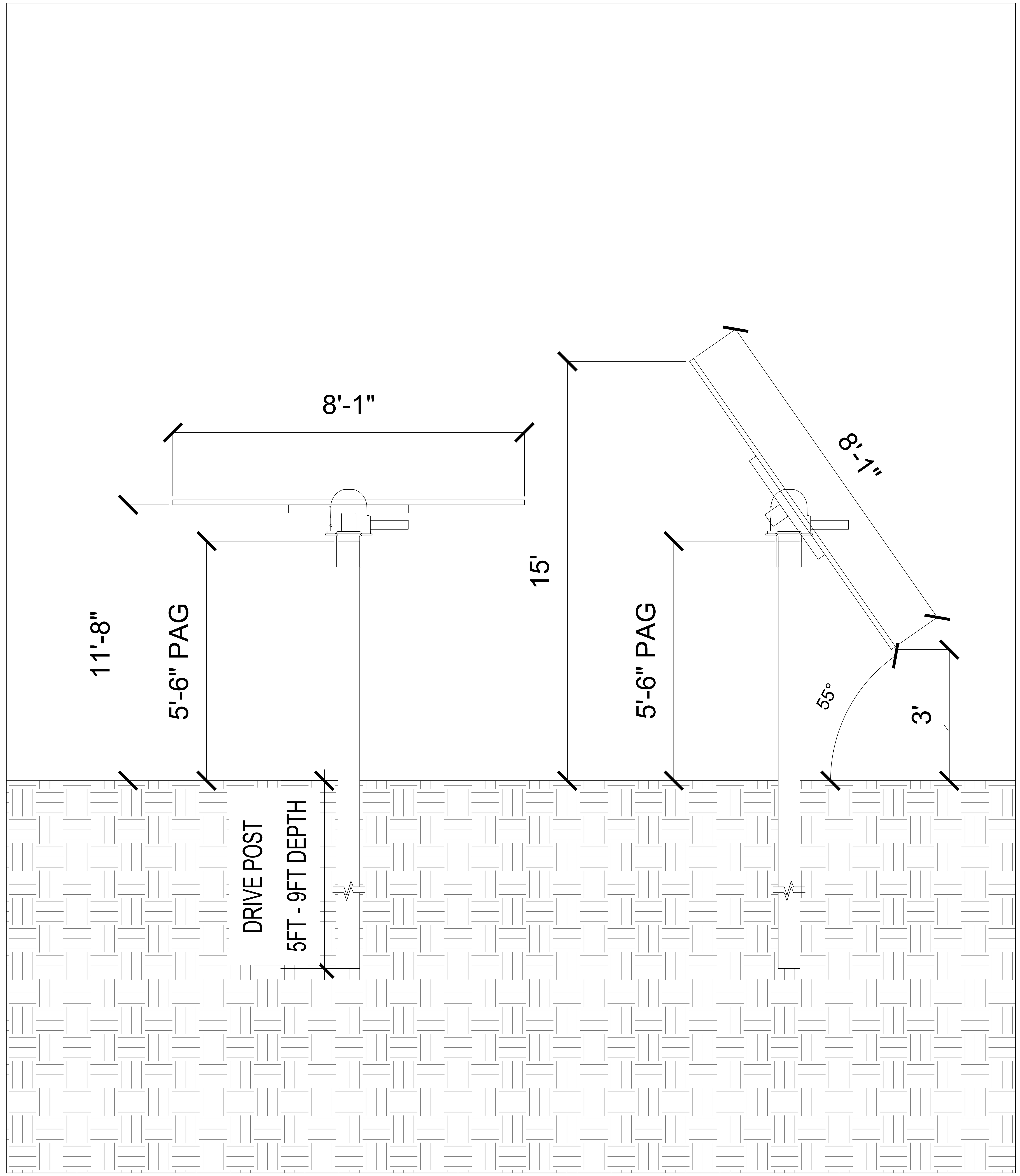

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02	2025-03-21	PROJECT EXTENDED AS MUCH AS POSSIBLE IN THE NE & S	MP	GS
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04	2026-01-30	PROJECT AREA REVISION	GS	MP
05	2026-03-06	PROJECT AREA REVISION	GS	MP
06	2026-03-17	PROJECT AREA/FENCE/ELEVATION LABELS REVISION	SM	GS

REVISION	DRAWN	CHECKED	APPROVED
06	SM	GS	DC

ENGINEER:	DAVID K, CLICK, PE
IL LIC #:	062.076524
NABCEP PVIP#:	041704-8

SEAL (PRELIMINARY, UNLESS SEALED)

UNECLIPSED ENERGY
UNECLIPSED ENERGY, PLLC
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

ESA
2250 Lucien Way, Suite 305
Maitland, FL 32751 USA

PROJECT NAME:

ELM LAWN SOLAR PARK
MONTGOMERY COUNTY

ADDRESS
173 YAEGER LAKE TRAIL, LITCHFIELD, IL 62056
COORDINATES
39.184913, -89.634755
SHEET SIZE
24" x 36"

N

SHEET TITLE
RACKING DETAILS
SHEET No.
Q501

Q502.1 PANEL SPECIFICATIONS

PANELS REFERENCED REPRESENT THE PRELIMINARY MODULE SPECIFICATIONS USED AS THE BASIS FOR SYSTEM LAYOUTS, PERFORMANCE MODELING, AND ASSOCIATED ENGINEERING CALCULATIONS. FINAL MODULE SELECTION MAY BE SUBJECT TO CHANGE BASED ON TECHNOLOGY AVAILABILITY, MANUFACTURER SPECIFICATIONS, PROCUREMENT CONSTRAINTS, OR PROJECT OPTIMIZATION DURING SUBSEQUENT DESIGN PHASES.

Q.PEAK DUO XL-G11S SERIES

Qcells

580-595 Wp | 156 Cells
21.3 % Maximum Module Efficiency

MODEL Q.PEAK DUO XL-G11S.3/BFG

Bifacial energy yield gain of up to 21%
Bifacial Q.ANTUM solar cells make efficient use of light shining on the module rear-side for radically improved LCOE.

Low electricity generation costs
Q.ANTUM DUO technology with optimized module layout to boost module power and improve LCOE.

A reliable investment
Double glass module design enables extended lifetime with 12-year product warranty and improved 30-year performance warranty[1].

Enduring high performance
Long-term yield security with Anti LID and Anti PID Technology[2], Hot-Spot Protect.

Frame for versatile mounting options
High-tech aluminum alloy frame protects from damage, enables use of a wide range of mounting structures and is certified regarding IEC for high snow (5400 Pa) and wind loads (2400 Pa).

Innovative all-weather technology
Optimal yields, whatever the weather with excellent low-light and temperature behavior.

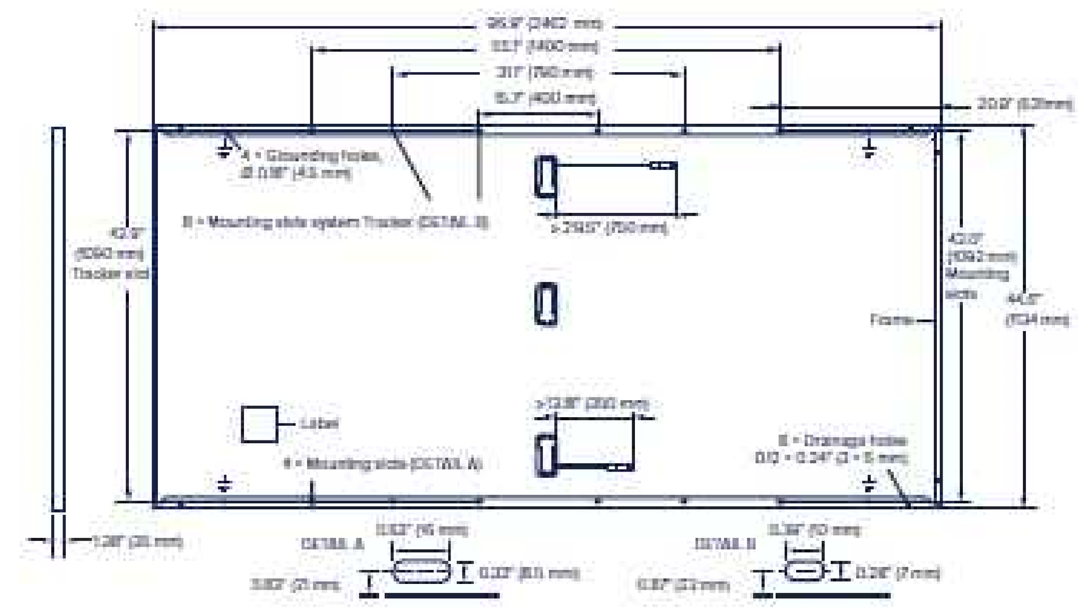
[1] See data sheet on rear for further information.
[2] APT test conditions according to IEC/TS 62804-1:2015 method B (−1500 V, 168 h) including post treatment according to IEC 61215-1-1 Ed. 2.0 (CD).

The ideal solution for:
Ground-mounted solar power plants

Q.PEAK DUO XL-G11S SERIES

Mechanical Specification

Format	96.9 in × 44.6 in × 1.38 in (including frame) (2462 mm × 1134 mm × 35 mm)
Weight	76.9 lbs (34.9 kg)
Front Cover	0.08 in (2.0 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	0.08 in (2.0 mm) semi-tempered glass
Frame	Anodised aluminium
Cell	6 × 26 monocrystalline Q.ANTUM solar half cells
Junction box	2.09-3.98 × 1.26-2.36 × 0.59-0.71 in (53-101 mm × 32-60 mm × 15-18 mm), Protection class IP67, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥29.5 in (750 mm), (−) ≥13.8 in (350 mm)
Connector	Stäubli MC4; Stäubli MC4-Evo2; - IP68



Electrical Characteristics

POWER CLASS			580		585		590		595	
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] (POWER TOLERANCE +5 W / −0 W)				BSTC*		BSTC*		BSTC*		BSTC*
Power at MPP[1]	P_{MPP}	[W]	580	634.4	585	639.9	590	645.4	595	650.8
Short Circuit Current[1]	I_{SC}	[A]	13.69	14.99	13.72	15.01	13.74	15.04	13.77	15.07
Open Circuit Voltage[1]	V_{OC}	[V]	53.55	53.74	53.57	53.76	53.60	53.79	53.63	53.82
Current at MPP	I_{MPP}	[A]	13.03	14.25	13.07	14.30	13.12	14.36	13.17	14.41
Voltage at MPP	V_{MPP}	[V]	44.53	44.52	44.75	44.74	44.96	44.95	45.18	45.17
Efficiency[1]	η	[%]	≥20.8		≥21.0		≥21.1		≥21.3	

(Minimum)

Bifaciality of P_{MPP} and I_{SC} 70% ±5% • Bifaciality given for rear side irradiation on top of STC (front side) • According to IEC 60904-1-2

[1]Measurement tolerances P_{MPP} ±3%; I_{SC}, V_{OC} ±5% at STC: 1000 W/m²; *at BSTC: 1000 W/m² + φ × 135 W/m², φ = 70% ±5%, 25 ± 2 °C, AM 1.5 according to IEC 60904-3

MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2]			580	585	590	595
Power at MPP	P_{MPP}	[W]	436.7	440.5	444.2	448.0
Short Circuit Current	I_{SC}	[A]	11.03	11.05	11.07	11.09
Open Circuit Voltage	V_{OC}	[V]	50.64	50.67	50.69	50.72
Current at MPP	I_{MPP}	[A]	10.25	10.30	10.34	10.38
Voltage at MPP	V_{MPP}	[V]	42.60	42.79	42.97	43.15

(Minimum)

[1]Measurement tolerances P_{MPP} ±3%; I_{SC}; V_{OC} ±5% at STC: 1000 W/m², 25 ± 2 °C, AM 1.5 according to IEC 60904-3 • [2]800 W/m², NMOT, spectrum AM 1.5

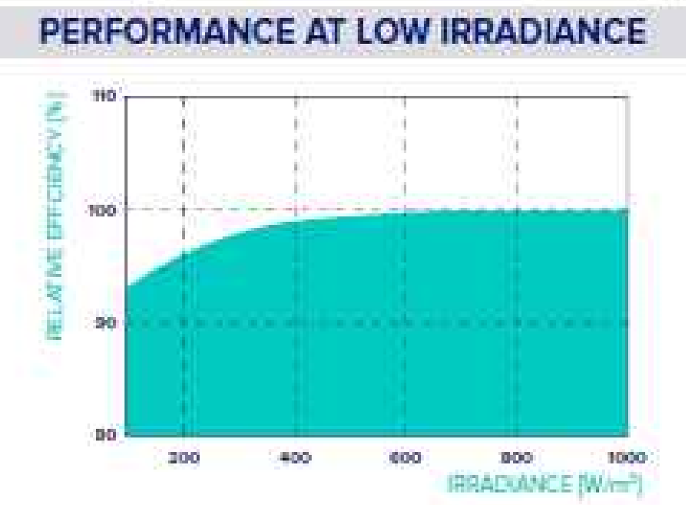
Qcells PERFORMANCE WARRANTY

At least 98 % of nominal power during first year. Thereafter max. 0.45 % degradation per year. At least 93.95 % of nominal power up to 10 years. At least 84.95 % of nominal power up to 30 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Qcells sales organisation of your respective country.

*Standard terms of guarantee for the 5 PV companies with the highest production capacity in 2021 (February 2021)

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²).

TEMPERATURE COEFFICIENTS

Temperature Coefficient of I_{SC}	α	[%/K]	+0.04	Temperature Coefficient of V_{OC}	β	[%/K]	−0.27
Temperature Coefficient of P_{MPP}	γ	[%/K]	−0.34	Nominal Module Operating Temperature	NMOT	[°F]	108 ± 5.4 (42 ± 3 °C)

Properties for System Design

Maximum System Voltage	V_{SYS}	[V]	1500	PV module classification	Class II
Maximum Series Fuse Rating		[A DC]	25	Fire Rating based on ANSI / UL 61730	TYPE 29[4]
Max. Design Load, Push / Pull[3]		[lbs/ft²]	75 (3600 Pa) / 33 (1600 Pa)	Permitted Module Temperature on Continuous Duty	−40 °F up to +185 °F (−40 °C up to +85 °C)
Max. Test Load, Push / Pull[3]		[lbs/ft²]	113 (5400 Pa) / 50 (2400 Pa)		

[3] See Installation Manual
[4] New Type is similar to Type 3 but with metallic frame

Qualifications and Certificates

UL 61730, CE-compliant,
IEC 61215:2016,
IEC 61730:2016,
U.S. Patent No. 9,893,215 (solar cells)

Qcells pursues minimizing paper output in consideration of the global environment.

Note: Installation instructions must be followed. Contact our technical service for further information on approved installation of this product.
Hanwha Q CELLS America Inc. 400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL hqc-inquiry@qcells.com | WEB www.qcells.com

REV.	DATE	REVISION DESCRIPTION	DRW	CHK
00	2025-03-07	SITE DEVELOPMENT	MP	GS
01	2025-03-11	PROJECT EXTENDED AS MUCH AS POSSIBLE IN THE NE	MP	GS
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06	2026-03-17	PROJECT AREA/FENCE/ELEVATION LABELS REVISION	SM	GS

REVISION	DRAWN	CHECKED	APPROVED
06	SM	GS	DC

ENGINEER:	DAVID K, CLICK, PE
IL LIC #:	062.076524
NABCEP PVIP#:	041704-8

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Maitland, FL 32751 USA

esa
ESA
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PROJECT NAME:
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MONTGOMERY COUNTY

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173 YAEGER LAKE TRAIL, LITCHFIELD, IL 62056
COORDINATES
39.184913, -89.634755
SHEET SIZE
24" x 36"

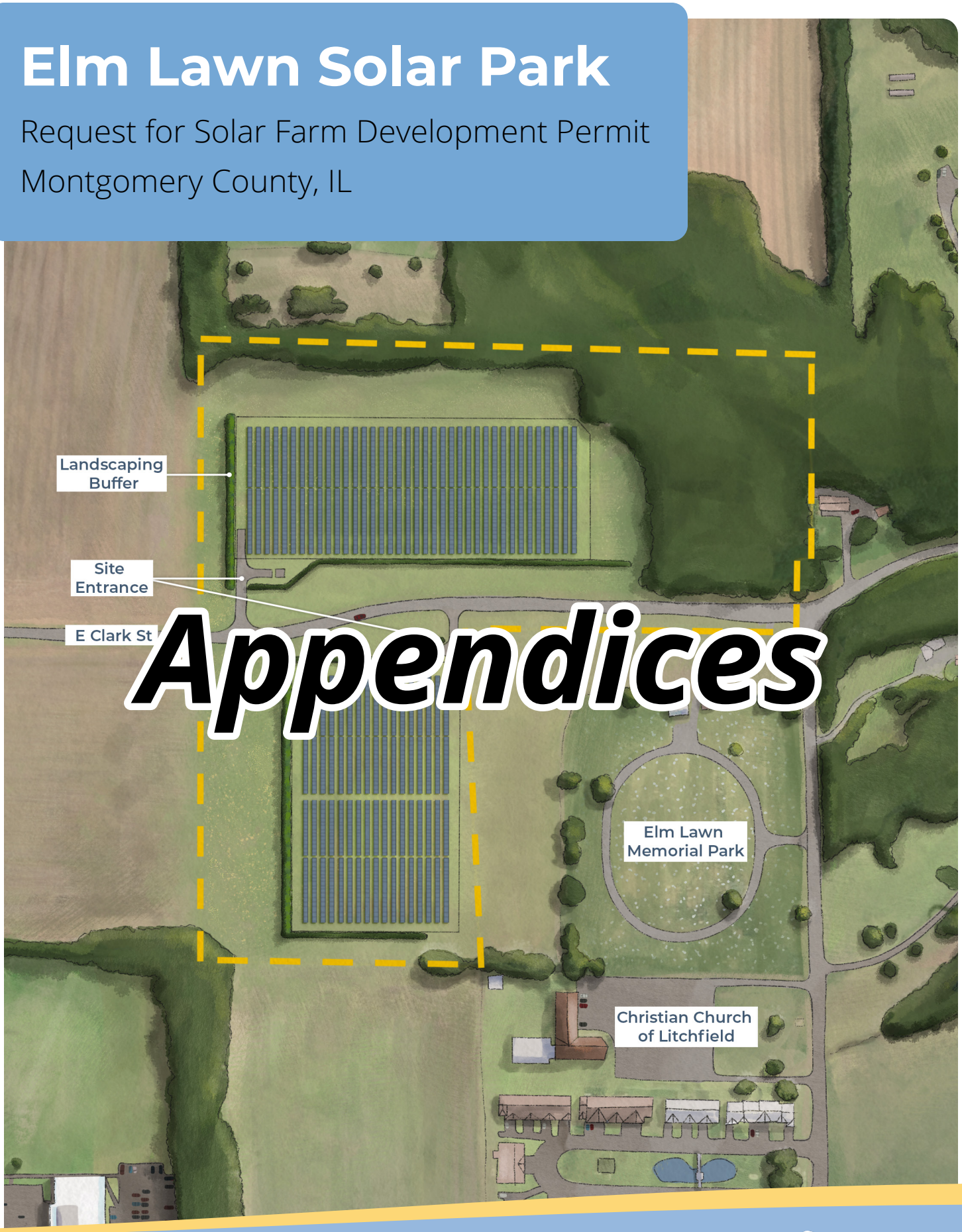
N

SHEET TITLE
PANEL SPECIFICATIONS
SHEET No.
Q502

Elm Lawn Solar Park

Request for Solar Farm Development Permit

Montgomery County, IL



Appendices

esa

March 2026

Elm Lawn Solar Park

Montgomery County, IL

Solar Farm Development Permit Application Appendicies

Applicant:
SDG IL DG, LLC
2250 Lucien Way, Suite 305
Maitland, FL 32751

Contacts/Agents:
Luis Gonzalez, Project Development Manager (lgonzalez@esa-solar.com)
Wes Shaffer, Director of Planning & Engagement (wshaffer@esa-solar.com)

Contents

Appendix A:
Lease Memorandum

202500001539
Filed for Record in
MONTGOMERY COUNTY, IL
SANDY LEITHEISER
06/11/2025 11:05 AM
DT0027 70.00
RHSP Surcharge 18.00
Page Count: 6

SPACE ABOVE THIS LINE FOR RECORDER'S USE

Prepared by &
Return to: Attn: Brent Silvester
SDG IL DG, LLC, LLC
2250 Lucien Way, Suite 305
Maitland, Fl 32751
Phone: 407-232-7440

MEMORANDUM OF ENERGY OPTION AND LAND LEASE

THIS MEMORANDUM OF ENERGY OPTION AND LAND LEASE ("**Memorandum**") executed as of the 28 day of May, 2025 by and **ELM LAWN MEMORIAL PARK, INC.**, an Illinois corporation ("**Lessor**" or "**Grantor**"), and **SDG IL DG, LLC,** a Delaware limited liability company ("**Lessee**" or "**Grantee**"). Lessor and Lessee may hereafter be referred to as, together, the "**Parties**".

RECITALS

A. Lessor and Lessee have entered into a certain a Energy Option and Land Lease ("**Lease**"), dated May 28, 2025 ("**Effective Date**"), whereby Lessor has agreed to lease to Lessee certain real property, together with access easement rights and an easement for the free and unobstructed collection and conversion of solar energy across said premises in Montgomery County, Illinois, bearing parcel identification number 10-34-100-019, and being more particularly described on the attached Exhibit A ("**Premises**").

B. The Parties desire to enter into and record this Memorandum so that third parties will have notice of the interests of the Lessee in the Premises. Capitalized terms used in this, but not otherwise defined in this Memorandum shall have the meanings ascribed to them in the Lease.

NOW, THEREFORE, in consideration of the mutual covenants and obligations of the Parties contained in this Memorandum and in the Lease, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:

1. Lessor and Lessee have entered into the Lease to lease and demise the Premises for solar energy purposes and to grant access and solar easements, which include prohibiting any

obstruction to the open and unobstructed access to the sun ("**Solar Easement**") throughout the entire Premises to and for the benefit of the area existing horizontally three hundred and sixty degrees (360°) from any point where any "**Solar Facility**" is or may be located at any time from time to time (each such point referred to as a "**Site**") and for a distance from each Site to the boundaries of the Premises, together vertically through all space located above the surface of the Premises, that is, one hundred eighty degrees (180°) or such greater number or numbers of degrees as may be necessary to extend from each point on and along a line drawn along the surface from each point along the exterior boundary of the Premises through each Site to each point and on and along such line to the opposite exterior boundary of the Premises. Pursuant to the Lease, Lessee has the exclusive right to use the Premises for solar energy purposes, together with certain related solar, access and other easement rights and other rights related to the Premises, all as more fully described in the Lease.

2. The initial term of the Lease ("**Option Period**") commences on the Effective Date and continues for a period of five years. If, prior to the expiration of the Option Period, Lessee has provided written notice to Lessor that it elects to extend the Lease term, the Lease shall be automatically extended for the Extended Term. The Extended Term shall commence on the Extended Term Date included in the Option Notice and continue until a date that is 20 years after the Extended Term Date unless sooner terminated in accordance with the terms of the Lease. Lessee has the right and option to extend the Extended Term for four additional periods of five years (each a "**Renewal Term**").

3. Subject in all respects to the terms and conditions of the Lease, Lessor has agreed that, from and after the Effective Date of the Lease, any right, title or interest created by Lessor in favor of or granted to any third party shall be subject to (i) the Lease and all of Lessee's rights, title and interests created thereby, (ii) any lien of any lender of Lessee's then in existence on the leasehold estate created by the Lease, and (iii) Lessee's right to create a lien in favor of any lender of Lessee's.

4. Lessee and any successor or assign of Lessee has the right under the Lease, without need for Lessor's consent, to do any of the following, conditionally or unconditionally, with respect to all or any portion of Lessee's right, title or interest in the Lease: hypothecate, mortgage, grant or pledge, or assign, sublease, transfer, or convey, provided that (i) any such assignment, transfer or conveyance shall not be for a period beyond the Term of the Lease; (ii) the assignee or transferee shall be subject to all of the obligations, covenants and conditions applicable to the Lessee; and (iii) Lessee shall be fully relieved from liability as to the rights, title and interest and obligations so assigned.

5. The solar photovoltaic power generating facility and/or energy storage facilities and all related equipment installed, owned and operated by Lessee and located at the Premises (collectively, the "**Facilities**") shall not be deemed a fixture. The Facilities are Lessee's personal property and Lessor has no right, title or interest in the Facilities. Further, Lessor has waived any and all rights it may have to place a lien on the Facilities.

6. The Premises shall be held, conveyed, assigned, hypothecated, encumbered, leased, used and occupied subject to the covenants, terms and provisions set forth in this Memorandum and in the Lease, which covenants, terms and provisions shall run with the Premises, and shall be binding upon and inure to the benefit of the Parties, and the Parties' respective heirs, executors, administrators, successors and assigns.

7. The terms and conditions of the Lease are incorporated by reference into this Memorandum as if set forth fully herein at length. In the event of any conflict between the terms and provisions of the Lease and this Memorandum, the Lease shall control.

8. Lessee is authorized to unilaterally correct typographical and scrivener's errors and add statements and information to this Memorandum to satisfy recording requirements, without obtaining Lessor's consent or signature, so long as such corrections and additions do not substantively affect the terms of the Lease or the rights or obligations of the parties. Lessee shall provide to Lessor a copy of the Memorandum with any such corrections and additions.

9. This Memorandum may be executed in counterparts, each of which shall be deemed an original and all of which when taken together shall constitute one and the same document.

[Signature page(s) follow]

IN WITNESS WHEREOF, each of the Parties hereto has caused this Memorandum to be duly executed as of the day and year first above written.

LESSOR:

ELM LAWN MEMORIAL PARK, INC., an Illinois corporation

Signature: Karl Krumsiek Sec./Sec.

Name: **KARL I. KRUMSIEK**

Title: **President & Secretary**

STATE OF ILLINOIS

ss.

COUNTY OF Christian

On the 22nd day of May, in the year 2025 before me, the undersigned, personally appeared **KARL I. KRUMSIEK**, in his capacity as **President & Secretary** of **ELM LAWN MEMORIAL PARK, INC.**, an Illinois corporation, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he/she executed the same in his/her capacity and that by his/her signature on the instrument, the entity upon behalf of which the individual acted, executed the instrument.

OFFICIAL SEAL
MASON A. CROWE
NOTARY PUBLIC - STATE OF ILLINOIS
Commission No. 985948
My Commission Expires January 23, 2028

Notary Public

Printed Notary Name: Mason A Crowe

My Commission Expires: 01/23/2028

Lessor's Signature Page to Memorandum of Lease

IN WITNESS WHEREOF, each of the Parties hereto has caused this Memorandum to be duly executed as of the day and year first above written.

LESSEE:

SDG IL DG, LLC, a Delaware limited liability company

By:_____

Name: Morgan Brawner

Title: Manager

STATE OF FLORIDA)
) ss:
COUNTY OF ORANGE)

The foregoing instrument was acknowledged before me by means of ☑ physical presence or ☐ online notarization, this 28 day of May, 2025, by Morgan Brawner, the Manager, of **SDG IL DG, LLC,** a Delaware limited liability company, on behalf of such entity. Such person is ☑ personally known to me or ☐ has produced _____ as identification.

_____
(Signature of Notary Public)

Printed Name: Stacey Madden

My Commission Expires: 2/9/27

[Affix Notary Seal]

STACEY MADDEN
MY COMMISSION # HH 360384
EXPIRES: February 9, 2027

Lessee's Signature Page to Memorandum of Lease

Exhibit A

Legal Description

The following tracts or parcels of land, situated in Montgomery County, State of Illinois.

The Southeast Quarter of the Northwest Quarter of Section 34, Township 9 North, Range 5 West of the Third Principal Meridian,

EXCEPTING THEREFROM the following described real estate: Commencing at a stone located in the Southwest corner of the Northwest Quarter of the Northwest Quarter of Section 34, thence South 88°28' East 1343.1 feet; thence South 0°23'30" East 1344.34 feet; thence South 88°28' East 857.87 feet for a point of beginning; thence South 88°28' East 481.03 feet to the center of said Section; thence South 0°17' East 584 feet; thence North 88°28' West 493.1 feet; thence South 0°54' East 584.38 feet to the place of beginning,

ALSO EXCEPTING THEREFROM the following described real estate: Commencing on the South line of the Southeast Quarter of the Northwest Quarter of said Section 34, at the Southwest corner of Elm Lawn Cemetery, measure West 250 feet along the Quarter Quarter Section line to a point; thence North733 feet along a line 250 feet West of and parallel to the West line of Elm Lawn Cemetery to a point; thence East 760 feet along a line 153 feet North of and parallel to the North line of Elm Lawn Cemetery to a point; thence South 153 feet (along the east line of Elm Lawn Cemetery extended northward) to the Northeast corner of Elm Lawn Cemetery; thence West along the north line of Elm Lawn Cemetery to the northwest corner of said Cemetery; thence South 580 feet along the west line of said Cemetery to the place of beginning, approximately 6 acres.

PARCEL ID NO.: 10-34-100-019 (27.42 acres)

E Clark Street, North Litchfield Township, IL 62056

B

Appendix B:

Interconnection Agreement

STANDARD AGREEMENT FOR INTERCONNECTION OF DISTRIBUTED ENERGY RESOURCES FACILITIES WITH A CAPACITY LESS THAN OR EQUAL TO 10 MVA

This agreement (together with all attachments, the "Agreement") is made and entered into this 03 day of March 2026, by and between SDG IL DG, LLC ("interconnection customer"), as a Limited Liability Company organized and existing under the laws of the State of Delaware and Ameren Illinois Company, ("Electric Distribution Company" or "EDC"), a corporation existing under the laws of the State of Illinois. Interconnection customer and EDC each may be referred to as a "Party", or collectively as the "Parties".

Recitals:

Whereas, interconnection customer is proposing to install or direct the installation of a distributed energy resources (DER) facility, or is proposing a generating capacity addition to an existing distributed energy resources (DER) facility, consistent with the interconnection request application form completed by interconnection customer on 06/27/2025; and

Whereas, the interconnection customer will operate and maintain, or cause the operation and maintenance of, the DER facility; and

Whereas, interconnection customer desires to interconnect the DER facility with EDC's electric distribution system.

Now, therefore, in consideration of the premises and mutual covenants set forth in this Agreement, and other good and valuable consideration, the receipt, sufficiency and adequacy of which are hereby acknowledged, the Parties covenant and agree as follows:

Article 1. Scope and Limitations of Agreement

1.1 This Agreement shall be used for all approved interconnection requests for DER facilities that fall under Levels 2, 3 and 4 according to the procedures set forth in Part 466 of the Commission's rules (83 Ill. Adm. Code 466) (referred to as the Illinois Distributed Energy Resources Interconnection Standard).

1.2 This Agreement governs the terms and conditions under which the DER facility will interconnect to, and operate in parallel with, the EDC's electric distribution system.

1.3 This Agreement does not constitute an agreement to purchase or deliver the interconnection customer's power.

1.4 Nothing in this Agreement is intended to affect any other agreement between the EDC and the interconnection customer.

1.5 Terms used in this agreement are defined as in Section 466.20 of the Illinois Distributed Energy Resources Interconnection Standard unless otherwise noted.

1.6 Responsibilities of the Parties

1.6.1 The Parties shall perform all obligations of this Agreement in accordance with all applicable laws and regulations.

1.6.2 The EDC shall construct, own, operate, and maintain its interconnection facilities in accordance with this Agreement.

1.6.3 The interconnection customer shall construct, own, operate, and maintain its distributed energy resources (DER) facility and interconnection facilities in accordance with this Agreement.

1.6.4 Each Party shall operate, maintain, repair, and inspect, and shall be fully responsible for, the facilities that it now or subsequently may own unless otherwise specified in the attachments to this Agreement. Each Party shall be responsible for the safe installation, maintenance, repair and condition of its respective lines and appurtenances on its respective sides of the point of interconnection.

1.6.5 The interconnection customer agrees to design, install, maintain and operate its DER facility so as to minimize the likelihood of causing an adverse system impact on the electric distribution system or any other electric system that is not owned or operated by the EDC.

1.7 Parallel Operation Obligations
Once the DER facility has been authorized to commence parallel operation, the interconnection customer shall abide by all operating procedures established in IEEE Standard 1547 and any other applicable laws, statutes or guidelines, including those specified in Attachment 4 of this Agreement.

1.8 Metering
The interconnection customer shall be responsible for the cost to purchase, install, operate, maintain, test, repair, and replace metering and data acquisition equipment specified in Attachments 5 and 6 of this Agreement.

1.9 Reactive Power

1.9.1 Interconnection customers with a DER facility larger than or equal to 1 MVA shall design their DER facilities to maintain a power factor at the point of interconnection between .95 lagging and .95 leading at all times. Interconnection customers with a DER facility smaller than 1 MVA shall design their DER

facility to maintain a power factor at the point of interconnection between .90 lagging and .90 leading at all times.

1.9.2 Any EDC requirements for meeting a specific voltage or specific reactive power schedule as a condition for interconnection shall be clearly specified in Attachment 4. Under no circumstance shall the EDC's additional requirements for voltage or reactive power schedules exceed the normal operating capabilities of the DER facility.

1.9.3 If the interconnection customer does not operate the distributed energy resources (DER) facility within the power factor range specified in Attachment 4, or does not operate the distribute generation facility in accordance with a voltage or reactive power schedule specified in Attachment 4, the interconnection customer is in default, and the terms of Article 6.5 apply.

1.10 Standards of Operations

The interconnection customer must obtain all certifications, permits, licenses and approvals necessary to construct, operate and maintain the facility and to perform its obligations under this Agreement. The interconnection customer is responsible for coordinating and synchronizing the DER facility with the EDC's system. The interconnection customer is responsible for any damage that is caused by the interconnection customer's failure to coordinate or synchronize the DER facility with the electric distribution system. The interconnection customer agrees to be primarily liable for any damages resulting from the continued operation of the DER facility after the EDC ceases to energize the line section to which the DER facility is connected. In Attachment 4, the EDC shall specify the shortest reclose time setting for its protection equipment that could affect the DER facility. The EDC shall notify the interconnection customer at least 10 business days prior to adopting a faster reclose time on any automatic protective equipment, such as a circuit breaker or line recloser, that might affect the DER facility.

Article 2. Inspection, Testing, Authorization, and Right of Access

2.1 Equipment Testing and Inspection

The interconnection customer shall test and inspect its DER facility including the interconnection equipment prior to interconnection in accordance with IEEE Standard 1547 (2003) and IEEE Standard 1547.1 (2005). The interconnection customer shall not operate its DER facility in parallel with the EDC's electric distribution system without prior written authorization by the EDC as provided for in Articles 2.1.1-2.1.3.

2.1.1 The EDC shall perform a witness test after construction of the DER facility is completed, but before parallel operation, unless the EDC specifically waives the witness test. The interconnection customer shall provide the EDC at least 15 business days' notice of the planned commissioning test for the DER facility. If the EDC performs a witness test at a time that is not concurrent with the commissioning test, it shall contact the interconnection customer to schedule the witness test at a mutually agreeable time within 10 business days after the scheduled commissioning test designated on the application. If the EDC does not perform the witness test within 10 business days after the commissioning test, the witness test is deemed waived unless the Parties mutually agree to extend the date for scheduling the witness test, or unless the EDC cannot do so for good cause, in which case, the Parties shall agree to another date for scheduling the test within 10 business days after the original scheduled date. If the witness test is not acceptable to the EDC, the EDC shall deliver in writing a detailed technical description of all deficiencies of the DER facility identified by the EDC during the witness test. The interconnection customer has 30 business days after receipt of the written description to address and resolve any deficiencies. This time period may be extended upon agreement between the EDC and the interconnection customer. If the interconnection customer fails to address and resolve the deficiencies to the satisfaction of the EDC, the applicable cure provisions of Article 6.5 shall apply. The interconnection customer shall, if requested by the EDC, provide a copy of all documentation in its possession regarding testing conducted pursuant to IEEE Standard 1547.1.

2.1.2 If the interconnection customer conducts interim testing of the DER facility prior to the witness test, the interconnection customer shall obtain permission from the EDC before each occurrence of operating the DER facility in parallel with the electric distribution system. The EDC may, at its own expense, send qualified personnel to the DER facility to observe such interim testing, but it cannot mandate that these tests be considered in the final witness test. The EDC is not required to observe the interim testing or precluded from requiring the tests be repeated at the final witness test. During and leading up to the witness test, the EDC shall not limit the interconnection customer's ability to test the DER facility during normal working hours except for safety and reliability reasons.

2.1.3 After the DER facility passes the witness test, the EDC shall affix an authorized signature to the certificate of completion and return it to the interconnection customer approving the interconnection and authorizing parallel operation. The authorization shall not be conditioned or delayed and the EDC shall return the signed certificate of completion to the interconnection customer no more than 10 business days after the date that the DER facility passes the witness test.

2.2 Commercial Operation
The interconnection customer shall not operate the DER facility, except for interim testing as provided in Article 2.1, until such time as the certificate of completion is signed by all Parties.

2.3 Right of Access
The EDC must have access to the disconnect switch and metering equipment of the DER facility at all times. When practical, the EDC shall provide notice to the customer prior to using its right of access.

Article 3. Effective Date, Term, Termination, and Disconnection

3.1 Effective Date
This Agreement shall become effective upon execution by all Parties.

3.2 Term of Agreement
This Agreement shall become effective on the effective date and shall remain in effect unless terminated in accordance with Article 3.3 of this Agreement.

3.3 Termination

3.3.1 The interconnection customer may terminate this Agreement at any time by giving the EDC 30 calendar days prior written notice.

3.3.2 Either Party may terminate this Agreement after default pursuant to Article 6.5.

3.3.3 The EDC may terminate, upon 60 calendar days' prior written notice, for failure of the interconnection customer to complete construction of the DER facility within 12 months after the in-service date as specified by the Parties in Attachment 2, which may be extended by agreement between the Parties.

3.3.4 The EDC may terminate this Agreement, upon 60 calendar days' prior written notice, if the interconnection customer has abandoned, cancelled, permanently disconnected or stopped development, construction, or operation of the DER facility, or if the interconnection customer fails to operate the DER facility in parallel with the EDC's electric system for three consecutive years.

3.3.5 Upon termination of this Agreement, the DER facility will be disconnected from the EDC's electric distribution system. Terminating this Agreement does not

relieve either Party of its liabilities and obligations that are owed or continuing when the Agreement is terminated.

3.3.6 If the Agreement is terminated, the interconnection customer loses its position in the interconnection queue.

3.4 Temporary Disconnection

A Party may temporarily disconnect the DER facility from the electric distribution system in the event one or more of the following conditions or events occurs:

3.4.1 Emergency conditions – shall mean any condition or situation: (1) that in the judgment of the Party making the claim is likely to endanger life or property; or (2) that the EDC determines is likely to cause an adverse system impact, or is likely to have a material adverse effect on the EDC's electric distribution system, interconnection facilities or other facilities, or is likely to interrupt or materially interfere with the provision of electric utility service to other customers; or (3) that is likely to cause a material adverse effect on the DER facility or the interconnection equipment. Under emergency conditions, the EDC or the interconnection customer may suspend interconnection service and temporarily disconnect the DER facility from the electric distribution system. The EDC must notify the interconnection customer when it becomes aware of any conditions that might affect the interconnection customer's operation of the DER facility. The interconnection customer shall notify the EDC when it becomes aware of any condition that might affect the EDC's electric distribution system. To the extent information is known, the notification shall describe the condition, the extent of the damage or deficiency, the expected effect on the operation of both Parties' facilities and operations, its anticipated duration, and the necessary corrective action.

3.4.2 Scheduled maintenance, construction, or repair – the EDC may interrupt interconnection service or curtail the output of the DER facility and temporarily disconnect the DER facility from the EDC's electric distribution system when necessary for scheduled maintenance, construction, or repairs on EDC's electric distribution system. The EDC shall provide the interconnection customer with notice no less than 5 business days before an interruption due to scheduled maintenance, construction, or repair, or the EDC shall provide notice immediately if the scheduled maintenance, construction, or repair is scheduled less than 5 business days in advance. The EDC shall coordinate the reduction or temporary disconnection with the interconnection customer; however, the interconnection customer is responsible for out-of-pocket costs incurred by the EDC for deferring or rescheduling maintenance, construction or repair at the interconnection customer's request.

3.4.3 Forced outages – The EDC may suspend interconnection service to repair the EDC's electric distribution system. The EDC shall provide the interconnection customer with prior notice, if possible. If prior notice is not possible, the EDC shall, upon written request, provide the interconnection customer with written documentation, after the fact, explaining the circumstances of the disconnection.

3.4.4 Adverse system impact – the EDC must provide the interconnection customer with written notice of its intention to disconnect the DER facility, if the EDC determines that operation of the DER facility creates an adverse system impact. The documentation that supports the EDC's decision to disconnect must be provided to the interconnection customer. The EDC may disconnect the DER facility if, after receipt of the notice, the interconnection customer fails to remedy the adverse system impact, unless emergency conditions exist, in which case, the provisions of Article 3.4.1 apply. The EDC may continue to leave the generating facility disconnected until the adverse system impact is corrected.

3.4.5 Modification of the DER facility – The interconnection customer must receive written authorization from the EDC prior to making any change to the DER facility, other than a minor equipment modification. If the interconnection customer modifies its facility without the EDC's prior written authorization, the EDC has the right to disconnect the DER facility until such time as the EDC concludes the modification poses no threat to the safety or reliability of its electric distribution system.

3.4.6 The EDC's compliance with Article 3 shall preclude any claim for damages for any lost opportunity or other costs incurred by the interconnection customer as a result of an interruption of service under Article 3. Any dispute over whether the EDC complied with Article 3 shall be resolved in accordance with the dispute resolution mechanism set forth in Article 8.

Article 4. Cost Responsibility for Interconnection Facilities and Distribution Upgrades

4.1 Interconnection Facilities

4.1.1 The interconnection customer shall pay, or reimburse the EDC, as applicable, for the cost of the interconnection facilities itemized in Attachment 3. The EDC shall identify the additional interconnection facilities necessary to interconnect the DER facility with the EDC's electric distribution system, the cost of those facilities, and the time required to build and install those facilities, as well as an estimated date of completion of the building or installation of those facilities.

4.1.2 The interconnection customer is responsible for its expenses, including overheads, associated with owning, operating, maintaining, repairing, and replacing its interconnection equipment.

4.2 Distribution Upgrades
The EDC shall design, procure, construct, install, and own any distribution upgrades. The actual cost of the distribution upgrades, including overheads, shall be directly assigned to the interconnection customer whose distributed energy resources (DER) facility caused the need for the distribution upgrades.

Article 5. Billing, Payment, Milestones, and Financial Security

5.1 Billing and Payment Procedures and Final Accounting (Applies to supplemental reviews conducted under Level 2 or 3 review with EDC construction necessary for accommodating the DER facility, and Level 4 reviews)

5.1.1 The EDC shall bill the interconnection customer for the design, engineering, construction, and procurement costs of EDC-provided interconnection facilities and distribution upgrades contemplated by this Agreement as set forth in Attachment 3. The billing shall occur on a monthly basis, or as otherwise agreed to between the Parties. The interconnection customer shall pay each bill within 30 calendar days after receipt, or as otherwise agreed to between the Parties.

5.1.2 Unless waived by the interconnection customer, within 90 calendar days after completing the construction and installation of the EDC's interconnection facilities and distribution upgrades described in Attachments 2 and 3 to this Agreement, the EDC shall provide the interconnection customer with a final accounting report of any difference between (1) the actual cost incurred to complete the construction and installation of the EDC's interconnection facilities and distribution upgrades; and (2) the interconnection customer's previous deposit and aggregate payments to the EDC for the interconnection facilities and distribution upgrades. If the interconnection customer's cost responsibility exceeds its previous deposit and aggregate payments, the EDC shall invoice the interconnection customer for the amount due and the interconnection customer shall pay the EDC within 30 calendar days. If the interconnection customer's previous deposit and aggregate payments exceed its cost responsibility under this Agreement, the EDC shall refund to the interconnection customer an amount equal to the difference within 30 calendar days after the final accounting report. Upon request from the interconnection customer, if the difference between the budget estimate and the actual cost exceeds 20%, the EDC will provide a written explanation for the difference.

5.1.3 If a Party disputes any portion of its payment obligation pursuant to this Article 5, the Party shall pay in a timely manner all non-disputed portions of its invoice, and the disputed amount shall be resolved pursuant to the dispute resolution provisions contained in Article 8. A Party disputing a portion of an Article 5 payment shall not be considered to be in default of its obligations under this Article.

5.2 Interconnection Customer Deposit

Within 15 business days after signing and returning the interconnection agreement to the EDC, the interconnection customer shall provide the EDC with a deposit equal to 100% of the estimated, non-binding cost to procure, install, or construct any such facilities. However, when the estimated date of completion of the building or installation of facilities exceeds three months from the date of notification, pursuant to Article 4.1.1 of this Agreement, this deposit may be held in escrow by a mutually agreed-upon third-party, with any interest to inure to the benefit of the interconnection customer. To the extent that this interconnection agreement is terminated for any reason, the EDC shall return all deposits provided by the interconnection customer, less any actual costs incurred by the EDC.

Article 6. Assignment, Limitation on Damages, Indemnity, Force Majeure, and Default

6.1 Assignment

This Agreement may be assigned by either Party. If the interconnection customer attempts to assign this Agreement, the assignee must agree to the terms of this Agreement in writing and such writing must be provided to the EDC. Any attempted assignment that violates this Article is void and ineffective. Assignment shall not relieve a Party of its obligations, nor shall a Party's obligations be enlarged, in whole or in part, by reason of the assignment. An assignee is responsible for meeting the same obligations as the assignor.

6.1.1 Either Party may assign this Agreement without the consent of the other Party to any affiliate (including mergers, consolidations or transfers, or a sale of a substantial portion of the Party's assets, between the Party and another entity), of the assigning Party that has an equal or greater credit rating and the legal authority and operational ability to satisfy the obligations of the assigning Party under this Agreement.

6.1.2 The interconnection customer can assign this Agreement, without the consent of the EDC, for collateral security purposes to aid in providing financing for the DER facility.

6.2 Limitation on Damages

Except for cases of gross negligence or willful misconduct, the liability of any Party to this Agreement shall be limited to direct actual damages and reasonable attorney's fees,

and all other damages at law are waived. Under no circumstances, except for cases of gross negligence or willful misconduct, shall any Party or its directors, officers, employees and agents, or any of them, be liable to another Party, whether in tort, contract or other basis in law or equity for any special, indirect, punitive, exemplary or consequential damages, including lost profits, lost revenues, replacement power, cost of capital or replacement equipment. This limitation on damages shall not affect any Party's rights to obtain equitable relief, including specific performance, as otherwise provided in this Agreement. The provisions of this Article 6.2 shall survive the termination or expiration of the Agreement.

6.3 Indemnity

6.3.1 This provision protects each Party from liability incurred to third parties as a result of carrying out the provisions of this Agreement. Liability under this provision is exempt from the general limitations on liability found in Article 6.2.

6.3.2 The interconnection customer shall indemnify and defend the EDC and the EDC's directors, officers, employees, and agents, from all damages and expenses resulting from a third party claim arising out of or based upon the interconnection customer's (a) negligence or willful misconduct or (b) breach of this Agreement.

6.3.3 The EDC shall indemnify and defend the interconnection customer and the interconnection customer's directors, officers, employees, and agents from all damages and expenses resulting from a third party claim arising out of or based upon the EDC's (a) negligence or willful misconduct or (b) breach of this Agreement.

6.3.4 Within 5 business days after receipt by an indemnified Party of any claim or notice that an action or administrative or legal proceeding or investigation as to which the indemnity provided for in this Article may apply has commenced, the indemnified Party shall notify the indemnifying Party of such fact. The failure to notify, or a delay in notification, shall not affect a Party's indemnification obligation unless that failure or delay is materially prejudicial to the indemnifying Party.

6.3.5 If an indemnified Party is entitled to indemnification under this Article as a result of a claim by a third party, and the indemnifying Party fails, after notice and reasonable opportunity to proceed under this Article, to assume the defense of such claim, that indemnified Party may, at the expense of the indemnifying Party, contest, settle or consent to the entry of any judgment with respect to, or pay in full, the claim.

6.3.6 If an indemnifying Party is obligated to indemnify and hold any indemnified Party harmless under this Article, the amount owing to the indemnified person shall be the amount of the indemnified Party's actual loss, net of any insurance or other recovery.

6.4 Force Majeure

6.4.1 As used in this Article, a force majeure event shall mean any act of God, labor disturbance, act of the public enemy, war, acts of terrorism, insurrection, riot, fire, storm or flood, explosion, breakage or accident to machinery or equipment through no direct, indirect, or contributory act of a Party, any order, regulation or restriction imposed by governmental, military or lawfully established civilian authorities, or any other cause beyond a Party's control. A force majeure event does not include an act of gross negligence or intentional wrongdoing by the Party claiming force majeure.

6.4.2 If a force majeure event prevents a Party from fulfilling any obligations under this Agreement, the Party affected by the force majeure event ("Affected Party") shall notify the other Party of the existence of the force majeure event within one business day. The notification must specify the circumstances of the force majeure event, its expected duration, and the steps that the Affected Party is taking and will take to mitigate the effects of the event on its performance. If the initial notification is verbal, it must be followed up with a written notification within one business day. The Affected Party shall keep the other Party informed on a continuing basis of developments relating to the force majeure event until the event ends. The Affected Party may suspend or modify its obligations under this Agreement (other than the obligation to make payments) only to the extent that the effect of the force majeure event cannot be otherwise mitigated.

6.5 Default

6.5.1 No default shall exist when the failure to discharge an obligation (other than the payment of money) results from a force majeure event as defined in this Agreement, or the result of an act or omission of the other Party.

6.5.2 A Party shall be in default ("Default") of this Agreement if it fails in any material respect to comply with, observe or perform, or defaults in the performance of, any covenant or obligation under this Agreement and fails to cure the failure within 60 calendar days after receiving written notice from the other Party. Upon a default of this Agreement, the non-defaulting Party shall give written notice of the default to the defaulting Party. Except as provided in Article 6.5.3, the defaulting Party has 60 calendar days after receipt of the default notice to cure the default; provided, however, if the default cannot be cured within 60 calendar days, the defaulting Party shall commence the cure within 20 calendar days after original

notice and complete the cure within six months from receipt of the default notice; and, if cured within that time, the default specified in the notice shall cease to exist.

6.5.3 If a Party has assigned this Agreement in a manner that is not specifically authorized by Article 6.1, fails to provide reasonable access pursuant to Article 2.3, and is in default of its obligations pursuant to Article 7, or if a Party is in default of its payment obligations pursuant to Article 5 of this Agreement, the defaulting Party has 30 days from receipt of the default notice to cure the default.

6.5.4 If a default is not cured as provided for in this Article, or if a default is not capable of being cured within the period provided for in this Article, the non-defaulting Party shall have the right to terminate this Agreement by written notice, and be relieved of any further obligation under this Agreement and, whether or not that Party terminates this Agreement, to recover from the defaulting Party all amounts due under this Agreement, plus all other damages and remedies to which it is entitled at law or in equity. The provisions of this Article shall survive termination of this Agreement.

Article 7. Insurance

For DER facilities with a nameplate capacity of 1 MVA or above, the interconnection customer shall carry sufficient insurance coverage so that the maximum comprehensive/general liability coverage that is continuously maintained by the interconnection customer during the term shall be not less than $2,000,000 for each occurrence, and an aggregate, if any, of at least $4,000,000. The EDC, its officers, employees and agents shall be added as an additional insured on this policy. The interconnection customer agrees to provide the EDC with at least 30 calendar days advance written notice of cancellation, reduction in limits, or non-renewal of any insurance policy required by this Article.

Article 8. Dispute Resolution

8.1 Parties shall attempt to resolve all disputes regarding interconnection as provided in this Article in a good faith manner.

8.2 If there is a dispute between the Parties about implementation or an interpretation of the Agreement, the aggrieved Party shall issue a written notice to the other Party to the Agreement that specifies the dispute and the Agreement articles that are disputed.

8.3 A meeting between the Parties shall be held within 10 days after receipt of the written notice. Persons with decision-making authority from each Party shall attend the meeting. If the dispute involves technical issues, persons with sufficient technical expertise and familiarity with the issue in dispute from each Party shall also attend the meeting. The meeting may be conducted by teleconference. The informal process between the parties

shall extend 30 days after the receipt of written notice, after which the dispute is deemed resolved and the timeframes for decisions within the interconnection process resume, unless one of the parties seeks resolution through non-binding arbitration procedures described in Article 8.4 or files a formal complaint at the Commission prior to the end of the 30-day period.

8.4 If the parties are unable to resolve the dispute through the process outlined in Article 8.3, either party may submit the interconnection dispute to an Ombudsman for non-binding arbitration. The party electing non-binding arbitration shall notify the other party of the request in writing. The non-binding arbitration process is limited to 60 days, absent mutual agreement of the parties and the Ombudsman to a longer period.

8.5 Each party shall bear its own fees, costs and expenses and an equal share of the expenses of the non-binding arbitration.

8.6 Within 10 days after the conclusion of the procedures in Article 8.4, either party may initiate a formal complaint with the Commission and ask for an expedited resolution of the dispute. If the complaint seeks expedited resolution, any written recommendation of the Ombudsman shall be appended to the complaint. The formal complaint shall proceed as a contested hearing pursuant to the Commission's Rules of Practice.

8.7 A party may, after good faith negotiations have failed, decline to pursue non-binding arbitration and instead initiate a formal complaint with the Commission. The formal complaint shall proceed as a contested hearing pursuant to the Commission's Rules of Practice.

8.8 Pursuit of dispute resolution may not affect an interconnection request or an interconnection applicant's position in the EDC's interconnection queue.

8.9 If the Parties fail to resolve their dispute under the dispute resolution provisions of this Article, nothing in this Article shall affect any Party's rights to obtain equitable relief, including specific performance, as otherwise provided in this Agreement.

Article 9. Miscellaneous

9.1 Governing Law, Regulatory Authority, and Rules

The validity, interpretation and enforcement of this Agreement and each of its provisions shall be governed by the laws of the State of Illinois, without regard to its conflicts of law principles. This Agreement is subject to all applicable laws and regulations. Each Party expressly reserves the right to seek change in, appeal, or otherwise contest any laws, orders or regulations of a governmental authority. The language in all parts of this Agreement shall in all cases be construed as a whole, according to its fair meaning, and not strictly for or against the EDC or interconnection customer, regardless of the involvement of either Party in drafting this Agreement.

9.2 Amendment

Modification of this Agreement shall be only by a written instrument duly executed by both Parties.

9.3 No Third-Party Beneficiaries

This Agreement is not intended to and does not create rights, remedies, or benefits of any character whatsoever in favor of any persons, corporations, associations, or entities other than the Parties, and the obligations in this Agreement assumed are solely for the use and benefit of the Parties, their successors in interest and, where permitted, their assigns.

9.4 Waiver

9.4.1 Except as otherwise provided in this Agreement, a Party's compliance with any obligation, covenant, agreement, or condition in this Agreement may be waived by the Party entitled to the benefits thereof only by a written instrument signed by the Party granting the waiver, but the waiver or failure to insist upon strict compliance with the obligation, covenant, agreement, or condition shall not operate as a waiver of, or estoppel with respect to, any subsequent or other failure.

9.4.2. Failure of any Party to enforce or insist upon compliance with any of the terms or conditions of this Agreement, or to give notice or declare this Agreement or the rights under this Agreement terminated, shall not constitute a waiver or relinquishment of any rights set out in this Agreement, but the same shall be and remain at all times in full force and effect, unless and only to the extent expressly set forth in a written document signed by that Party granting the waiver or relinquishing any such rights. Any waiver granted, or relinquishment of any right, by a Party shall not operate as a relinquishment of any other rights or a waiver of any other failure of the Party granted the waiver to comply with any obligation, covenant, agreement, or condition of this Agreement.

9.5 Entire Agreement

Except as provided in Article 9.1, this Agreement, including all attachments, constitutes the entire Agreement between the Parties with reference to the subject matter of this Agreement, and supersedes all prior and contemporaneous understandings or agreements, oral or written, between the Parties with respect to the subject matter of this Agreement. There are no other agreements, representations, warranties, or covenants that constitute any part of the consideration for, or any condition to, either Party's compliance with its obligations under this Agreement.

9.6 Multiple Counterparts

This Agreement may be executed in two or more counterparts, each of which is deemed an original, but all constitute one and the same instrument.

9.7 No Partnership

This Agreement shall not be interpreted or construed to create an association, joint venture, agency relationship, or partnership between the Parties, or to impose any partnership obligation or partnership liability upon either Party. Neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as or be an agent or representative of, or to otherwise bind, the other Party.

9.8 Severability

If any provision or portion of this Agreement shall for any reason be held or adjudged to be invalid or illegal or unenforceable by any court of competent jurisdiction or other governmental authority, (1) that portion or provision shall be deemed separate and independent, (2) the Parties shall negotiate in good faith to restore insofar as practicable the benefits to each Party that were affected by the ruling, and (3) the remainder of this Agreement shall remain in full force and effect.

9.9 Environmental Releases

Each Party shall notify the other Party of the release of any hazardous substances, any asbestos or lead abatement activities, or any type of remediation activities related to the DER facility or the interconnection facilities, each of which may reasonably be expected to affect the other Party. The notifying Party shall (1) provide the notice as soon as practicable, provided that Party makes a good faith effort to provide the notice no later than 24 hours after that Party becomes aware of the occurrence, and (2) promptly furnish to the other Party copies of any publicly available reports filed with any governmental authorities addressing such events.

9.10 Subcontractors

Nothing in this Agreement shall prevent a Party from using the services of any subcontractor it deems appropriate to perform its obligations under this Agreement; provided, however, that each Party shall require its subcontractors to comply with all applicable terms and conditions of this Agreement in providing services and each Party shall remain primarily liable to the other Party for the performance of the subcontractor.

9.10.1 A subcontract relationship does not relieve any Party of any of its obligations under this Agreement. The hiring Party remains responsible to the other Party for the acts or omissions of its subcontractor. Any applicable obligation imposed by this Agreement upon the hiring Party shall be equally binding upon, and shall be construed as having application to, any subcontractor of the hiring Party.

9.10.2 The obligations under this Article cannot be limited in any way by any limitation of subcontractor's insurance.

Article 10. Notices

10.1 General

Unless otherwise provided in this Agreement, any written notice, demand, or request required or authorized in connection with this Agreement ("Notice") shall be deemed properly given if delivered in person, delivered by recognized national courier service, or sent by first class mail, postage prepaid, to the person specified below:

If to Interconnection Customer:

Interconnection Customer: SDG IL DG LLC

Attention: Justin Vandenbroeck

Address: 2250 Lucien Way Suite 305

City: Maitland State: Florida Zip: 32751`

Phone: (407) 232-7440 Fax: E-Mail: dg-interconnection@esa-solar.com

If to EDC:

EDC: Ameren Illinois Company

Attention: Ameren Illinois Net Metering Coordinator

Address: 10 Richard Mark Way – Mail Code 910

City: Collinsville State: IL Zip: 62234

Phone: Fax: E-Mail: RenewablesIllinois@ameren.com

Alternative Forms of Notice

Any notice or request required or permitted to be given by either Party to the other Party and not required by this Agreement to be in writing may be given by telephone, facsimile or e-mail to the telephone numbers and e-mail addresses set out above.

10.2 Billing and Payment

Billings and payments shall be sent to the addresses set out below:

If to Interconnection Customer:

Interconnection Customer: SDG IL DG LLC

Attention: Luis Gonzalez - Development Manager

Address: 2250 Lucien Way Suite 305

City: Maitland State: Florida Zip: 32751

If to EDC:

EDC: Ameren Illinois

Attention: Ameren Net Metering Coordinator

Address: 10 Richard Mark Way – Mail Code 910

City: Collinsville State: IL Zip: 62234

10.3 Designated Operating Representative

The Parties may also designate operating representatives to conduct the communications that may be necessary or convenient for the administration of this Agreement. This person will also serve as the point of contact with respect to operations and maintenance of the Party's facilities.

Interconnection Customer's Operating Representative:

Attention: Dave Click - CTO

Address: 2250 Lucien Way Suite 305

City: Maitland State: Florida Zip: 32751

EDC's Operating Representative: Ameren Illinois

Attention: Ameren Illinois Net Metering Coordinator

Address: 10 Richard Mark Way – Mail Code 910

City: Collinsville State: IL Zip: 62234

10.4 Changes to the Notice Information

Either Party may change this notice information by giving five business days written notice before the effective date of the change.

Article 11. Signatures

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their respective duly authorized representatives.

For the Interconnection Customer: -

Name: SDG IL DG LLC attn: Justin Vandenbroeck

Title: Member

Date: _____

For EDC:

Name: _____

Title: _____

Date: _____

Attachment 1

Definitions

Adverse system impact – A negative effect that compromises the safety or reliability of the electric distribution system or materially affects the quality of electric service provided by the electric distribution company (EDC) to other customers.

Applicable laws and regulations – All duly promulgated applicable federal, State and local laws, regulations, rules, ordinances, codes, decrees, judgments, directives, or judicial or administrative orders, permits and other duly authorized actions of any governmental authority, having jurisdiction over the Parties.

Commissioning test – Tests applied to a distributed energy resources (DER) facility by the applicant after construction is completed to verify that the facility does not create adverse system impacts. At a minimum, the scope of the commissioning tests performed shall include the commissioning test specified IEEE Standard 1547 Section 5.4 "Commissioning tests."

Distributed Energy Resources (DER) facility – The equipment used by an interconnection customer to generate or store electricity that operates in parallel with the electric distribution system. A distributed generation facility typically includes an electric generator, prime mover, and the interconnection equipment required to safely interconnect with the electric distribution system or a local electric power system.

Distribution upgrades – A required addition or modification to the EDC's electric distribution system at or beyond the point of interconnection to accommodate the interconnection of a distributed energy resources (DER) facility. Distribution upgrades do not include interconnection facilities.

Electric distribution company or EDC – Any electric utility entity subject to the jurisdiction of the Illinois Commerce Commission.

Electric distribution system – The facilities and equipment used to transmit electricity to ultimate usage points such as homes and industries from interchanges with higher voltage transmission networks that transport bulk power over longer distances. The voltage levels at which electric distribution systems operate differ among areas but generally carry less than 100 kilovolts of electricity. Electric distribution system has the same meaning as the term Area EPS, as defined in 3.1.6.1 of IEEE Standard 1547.

Facilities study – An engineering study conducted by the EDC to determine the required modifications to the EDC's electric distribution system, including the cost and the time required to build and install the modifications, as necessary to accommodate an interconnection request.

Force majeure event – Any act of God, labor disturbance, act of the public enemy, war, acts of terrorism, insurrection, riot, fire, storm or flood, explosion, breakage or accident to machinery or equipment through no direct, indirect, or contributory act of a Party, any order, regulation or

restriction imposed by governmental, military or lawfully established civilian authorities, or any other cause beyond a Party's control. A force majeure event does not include an act of gross negligence or intentional wrongdoing.

Governmental authority – Any federal, State, local or other governmental regulatory or administrative agency, court, commission, department, board, other governmental subdivision, legislature, rulemaking board, tribunal, or other governmental authority having jurisdiction over the Parties, their respective facilities, or the respective services they provide, and exercising or entitled to exercise any administrative, executive, police, or taxing authority or power; provided, however, that this term does not include the interconnection customer, EDC or any affiliate of either.

IEEE Standard 1547 – The Institute of Electrical and Electronics Engineers, Inc. (IEEE), 3 Park Avenue, New York NY 10016-5997, Standard 1547 (2003), "Standard for Interconnecting Distributed Resources with Electric Power Systems."

IEEE Standard 1547.1 – The IEEE Standard 1547.1 (2005), "Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems."

Interconnection agreement or Agreement – The agreement between the interconnection customer and the EDC. The interconnection agreement governs the connection of the distributed energy resources (DER) facility to the EDC's electric distribution system and the ongoing operation of the distributed generation facility after it is connected to the EDC's electric distribution system.

Interconnection customer – The entity entering into this Agreement for the purpose of interconnecting a distributed energy resources (DER) facility to the EDC's electric distribution system.

Interconnection equipment – A group of components or an integrated system connecting an electric generator with a local electric power system or an electric distribution system that includes all interface equipment, including switchgear, protective devices, inverters or other interface devices. Interconnection equipment may be installed as part of an integrated equipment package that includes a generator or other electric source.

Interconnection facilities – Facilities and equipment required by the EDC to accommodate the interconnection of a distributed energy resources (DER) facility. Collectively, interconnection facilities include all facilities, and equipment between the distributed energy resources (DER) facility and the point of interconnection, including modification, additions, or upgrades that are necessary to physically and electrically interconnect the distributed energy resources (DER) facility to the electric distribution system. Interconnection facilities are sole use facilities and do not include distribution upgrades.

Interconnection request – An interconnection customer's request, on the required form, for the interconnection of a new distributed energy resources (DER) facility, or to increase the capacity or change the operating characteristics of an existing distributed energy resources (DER) facility that is interconnected with the EDC's electric distribution system.

Interconnection study – Any of the following studies, as determined to be appropriate by the EDC: the interconnection feasibility study, the interconnection system impact study, and the interconnection facilities study.

Illinois standard distributed energy resources interconnection rules – The most current version of the procedures for interconnecting distributed energy resources (DER) facilities adopted by the Illinois Commerce Commission. See 83 Ill. Adm. Code 466.

Parallel operation or Parallel – The state of operation that occurs when a distributed energy resources (DER) facility is connected electrically to the electric distribution system.

Point of interconnection – The point where the distributed energy resources (DER) facility is electrically connected to the electric distribution system. Point of interconnection has the same meaning as the term "point of common coupling" defined in 3.1.13 of IEEE Standard 1547.

Witness test – For lab-certified equipment, verification (either by an on-site observation or review of documents) by the EDC that the interconnection installation evaluation required by IEEE Standard 1547 Section 5.3 and the commissioning test required by IEEE Standard 1547 Section 5.4 have been adequately performed. For interconnection equipment that has not been lab-certified, the witness test shall also include verification by the EDC of the on-site design tests required by IEEE Standard 1547 Section 5.1 and verification by the EDC of production tests required by IEEE Standard 1547 Section 5.2. All tests verified by the EDC are to be performed in accordance with the test procedures specified by IEEE Standard 1547.1.

Attachment 2

Construction Schedule, Proposed Equipment & Settings

This attachment is to be completed by the interconnection customer and shall include the following:

1. The construction schedule for the distributed energy resources (DER) facility.

2. A one-line diagram indicating the distributed energy resources (DER) facility, interconnection equipment, interconnection facilities, metering equipment, and distribution upgrades.

3. Component specifications for equipment identified in the one-line diagram.

4. Component settings.

5. Proposed sequence of operations.

6. A three line diagram showing current potential circuits for protective relays.

7. Relay tripping and control schematic diagram.

Attachment 3

Description, Costs and Time Required to Build and Install the EDC's Interconnection Facilities

This attachment is to be completed by the EDC and shall include the following:

1. Required interconnection facilities, including any required metering.

   Per the prior studies - EDC shall build the substation facilities as required to support the interconnection of the interconnection customer proposed facility up to the point of disconnect. The interconnection would consist of upgrades identified in Appendix A. The interconnection customer would be responsible for construction to the point of disconnect. All costs shall be paid for and/or reimbursed by the interconnection customer pursuant to Article 5 of this agreement. The interconnection customer is required to construct all facilities which connect to EDC's facilities or otherwise interface with EDC's facilities, all as determined by EDC's final, detailed engineering, in accordance with EDC's published standards.

   Additional required interconnection facilities and system upgrades may be identified while completing Detailed Engineering.

2. An estimate of itemized costs charged by the EDC for interconnection, including overheads, based on results from prior studies.

   CS_IL_0011: 173 Yaeger Lake Trl, Litchfield, IL- **2000 KW**

   (PowerClerk DER-63100)

   Queue Position:2

   NOTE: *THE COST ESTIMATE PROVIDED FOR YOUR PROJECT IN THE NEXT SECTION IS CONTINGENT UPON CONSTRUCTION COMPLETION OF ALL SYSTEM UPGRADES REQUIRED OF PROJECT(S) AHEAD OF YOUR PROJECT IN THE QUEUE THAT HAVE AN IMPACT ON THE CONNECTION OF YOUR PROJECT. SHOULD ANY ONE OR MORE OF SUCH PROJECTS WITHDRAW FOR ANY REASON, THE COSTS ASSOCIATED WITH YOUR PROJECT MAY CHANGE TO REFLECT THE COST IMPACT OF SYSTEM UPGRADES THAT NOW MAY BE*

REQUIRED TO CONNECT YOUR PROJECT AS A RESULT OF THE WITHDRAWAL OF SUCH HIGHER QUEUED PROJECTS.

An estimate of itemized costs charged by the EDC for interconnection, including overheads.

$586,000.00 for upgrades identified in Appendix A. This will be subject to a true-up process at the end of the project.

Ameren Illinois reserves the right to revise this estimate prior to and during construction based on the requirements of Good Utility practices not foreseen at the time of the original estimate. The revisions to the estimate may include, but are not limited to, changes in the cost of materials and required labor.

Notwithstanding Section 5.2 of this Agreement, the Parties may agree to other forms of security in lieu of a cash deposit provided such other form of security is acceptable to the EDC.

3. An estimate for the time required to build and install the EDC's interconnection facilities based on results from prior studies and an estimate of the date upon which the facilities will be completed.

   The final construction timeline will be developed during the scoping meeting which will be held with the applicant after the deposit is paid in full and will continue to be updated as the developer and Ameren Illinois work thru the construction process. That notwithstanding, it is anticipated that Ameren Illinois will initiate procurement activities immediately following the scoping meeting. Any revisions to the current scope of construction activities and their timeline will be provided immediately after that discussion. The requested in-service date is dependent on the availability of any long lead time equipment and weather impacts on construction activities.

Attachment 4

Operating Requirements for Distributed Energy Resources Facilities Operating in Parallel

The EDC shall list specific operating practices that apply to this distributed energy resources (DER) interconnection and the conditions under which each listed specific operating practice applies.

1. Customer shall meet requirements specified in Level 2 or 4 study.

Attachment 5

Monitoring and Control Requirements

This attachment is to be completed by the EDC and shall include the following:

1. The EDC's monitoring and control requirements must be specified, along with a reference to the EDC's written requirements documents from which these requirements are derived.

2. An internet link to the requirements documents.

https://www.ameren.com/-/media/files/resources-and-support/construction/service-manual/ameren-electric-service-manual.ashx

http://standards.ieee.org

Attachment 6

Metering Requirements

This attachment is to be completed by the EDC and shall include the following:

1. The metering requirements for the distributed energy resources (DER) facility.

   The specific metering requirements and equipment will be specified as part of the Detailed Engineering.

2. Identification of the appropriate tariffs that establish these requirements.

3. An internet link to these tariffs.

https://www.ameren.com/bill/rates/business

https://www.ameren.com/service/renewables

Attachment 7

As Built Documents

This attachment is to be completed by the interconnection customer and shall include the following:

When it returns the certificate of completion to the EDC, the interconnection customer shall provide the EDC with documents detailing the as-built status of the following:

1. A one-line diagram indicating the distributed generation facility, interconnection equipment, interconnection facilities, and metering equipment.

2. Component specifications for equipment identified in the one-line diagram.

3. Component settings.

4. Proposed sequence of operations.

5. A three-line diagram showing current potential circuits for protective relays.

6. Relay tripping and control schematic diagram.

Appendix A
DER-63100
Facility Document

Level 4 Feasibility, System Impact Study, and Facilities Study

DER-63100 Analysis Worksheet

Project Name and Size: CS_IL_0011 – 2.0MW

POI Feeder: Litchfield N95-823

System Voltage and Configuration: 12.47kV 4-wire wye

Queue Position: 2

Date: 1/13/2025

Engineer: Travis Raburn

Territory

Y N

☒ ☐ Is the PV array 100% within Ameren territory?

If no to above question, note that Ameren cannot serve a DER that is not 100% within Ameren territory. A general map of the territory is provided at the end of this report.

Determine Extreme Load Cases:

Y N

☒ ☐ Is the PV a tracking array? *(U se 10 AM to 4 PM for fixed arrays and 8 AM to 6 PM for tracking arrays to determine minimum load during solar generating hours)*

Minimum Load during Solar Production:

Feeder #	Date/Time	MW	MVAR	A Amps	B Amps	C Amps	PF
N95-823	4/19/24 LA			81	94	90	0.98
N95-824	11/23/23 LA			56	37	50	0.98

Peak Load:

Feeder #	Date/Time	MW	MVAR	A Amps	B Amps	C Amps	PF
N95-823	8/26/24 LA			326	355	319	0.98
N95-824	8/26/24 LA			230	182	204	0.98

Total generation on the circuit prior to this DER (including projects queued but not yet constructed): **5.55** MW

Total generation on the substation prior to this DER (including projects queued but not yet constructed): **6.97** MW

Power Flow:

Y N

☒ ☐ Is reverse flow possible for line devices and/or feeder head under normal conditions at minimum load?

☒ ☐ Does reverse flow cause overloads to conductors, regulators, etc. (normal or contingency)? Note that devices have a 90% loading limit before requiring upgrade to provide headroom, accounting for potential load drop due to partial line outages or load reduction due to EE.

List of facilities overloaded with % overload:

2/0ACSR conductor is loaded up to 106%
Line recloser 823-2 is loaded up to 90%

☒ ☐ Do any line sections experience overvoltage at minimum load caused by the DER (normal or contingency)?

Explain:

Voltages rise to 127.13V before any mitigations. After replacing the required 2/0ACSR conductor, this lowers to be within acceptable limits.

☒ ☐ Notify sub-transmission planning engineer if reverse flow is possible at the substation transformer.

- Were any sub-transmission system impacts identified? If so, please list below:

This distribution transformer is tapped off of a subtransmission bus.

- Per sub-transmission planning's review, is the queue position of this project impacted by other projects on the shared sub-transmission line? Please list any queue position impacts below:

N/A

☒ ☐ Ameren Transmission reviewed the application and determined the need for MISO *screening* which will determine the need for a MISO AFS (affected facilities study). A MISO AFS may be required, and the fees associated with the study will result in an additional charge to the interconnection applicant. MISO will not notify if an AFS *study* is needed until after ***3/16/25*** . Reviews are done quarterly by MISO. Due to the processing timelines contained in Illinois' interconnection rules and the time required for MISO to conduct its study, this DER application may require a signed interconnection agreement or withdrawal from the queue before having results from MISO.

Ameren will not send this DER to MISO for the screening until you have had the opportunity to review this report and choose to downsize or continue at the current size and voltage. If you choose to continue at the current size / voltage and the application is sent to MISO for screening, there is no chance to downsize at that point.

Ameren does not know what KW /MW value will initiate the MISO screening.

Rapid Voltage Change:

Solar Minimum Load Screener Before Mitigations

Screen 2.00 MW at 100 pf on DER63100 POI			Maximum Value									
Code	Description	Limit	0.0 MW	0.2 MW	0.4 MW	0.6 MW	0.8 MW	1.0 MW	1.2 MW	1.4 MW	1.6 MW	1.8 MW	2.0 MW
DCS_70	Maximum prim voltage	127.0 V	124.5	124.7	124.8	124.9	125.1	125.2	125.4	125.5	125.7	125.8	125.9
DCS_60	Minimum prim voltage	117.0 V	123.2	123.2	123.3	123.3	123.3	123.3	123.3	123.4	123.4	123.4	123.4
DCS_10	Maximum feeder loading	90 %	18.7	16.5	14.5	13.2	11.9	11.5	11.5	11.5	11.5	11.5	11.5
DCS_55	Maximum conductor loading	90 %	16.0	16.0	16.0	16.0	16.2	19.7	23.3	26.9	30.5	34.1	37.8
DCS_50	Maximum transformer loading	90 %	16.2	14.8	13.4	12.1	10.8	9.5	8.3	7.1	6.0	5.2	4.6
DCS_20	Delta volts any section	3.6 V		0.2	0.3	0.5	0.6	0.8	1.0	1.1	1.3	1.4	1.6
DCS_21	Delta volts any reg	2.4 V		0.1	0.3	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.2
DCS_22	Delta volts any LTC	2.4 V											
DCS_23	Delta volts at gen	3.6 V		0.2	0.3	0.5	0.6	0.8	1.0	1.1	1.3	1.4	1.6
DCS_24	Delta volts all trip	3.6 V		0.2	0.3	0.5	0.6	0.8	1.0	1.1	1.3	1.4	1.6
DCS_30	Feeder reverse flow	90 %								5.2	6.9	8.8	10.9
DCS_32	Subtran reverse flow	90 %											
DCS_48	Conductor reverse flow	90 %	7.0	7.0	9.3	12.7	16.2	19.7	23.3	26.9	30.5	34.1	37.8
DCS_34	LTC wth co-gen reverse flow	15 %											
DCS_35	LTC no co-gen reverse flow	75 %											
DCS_36	Fixed tap tran reverse flow	90 %											
DCS_37	Regulator reverse flow	90 %	11.8	13.7	20.4	28.3	36.2	44.1	52.0	59.9	67.8	75.7	83.5
DCS_45	Manual switch reverse flow	90 %	0.1	0.1	0.1	0.1	0.1	0.1	0.1	3.4	4.5	5.7	7.1
DCS_46	Automatic switch reverse flow	90 %											
DCS_38	Fuse reverse flow	90 %	26.9	26.9	26.8	26.8	26.8	26.7	26.7	26.6	26.6	26.6	26.5
DCS_39	Hydraulic recloser reverse flow	0 %	13.2	15.3	22.4	30.5	38.9	47.5	56.2	64.9	73.6	82.3	91.0
DCS_40	Electronic recloser reverse flow	90 %	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.0	11.0	11.0	11.0
DCS_41	Electronic fuse reverse flow	90 %											
DCS_42	Mechanical relay breaker reverse flow	0 %											
DCS_43	Electronic relay breaker reverse flow	90 %											
MET_10	Feeder kW demand		1365.2	1165.6	966.4	767.7	569.3	371.4	173.8	-23.4	-220.1	-416.6	-612.6
MET_20	Section kW into		-0.0	-200.0	-400.0	-599.9	-799.9	-999.8	-1199.7	-1399.6	-1599.5	-1799.3	-1999.2
MET_30	Section high volts		124.5	124.7	124.8	125.0	125.1	125.2	125.4	125.5	125.7	125.8	126.0
MET_40	Sub kW demand		2182.1	1982.7	1783.7	1585.1	1386.9	1189.1	991.6	794.6	597.9	401.6	205.7
MET_50	Sub pct pf		96.5	95.8	94.9	93.7	92.0	89.5	85.8	80.0	70.7	55.6	32.3
MET_60	Subtran tap												

Solar Minimum Load Screener After Mitigations

Screen 2.00 MW at 100 pf on DER63100 POI			Maximum Value									
Code	Description	Limit	0.0 MW	0.2 MW	0.4 MW	0.6 MW	0.8 MW	1.0 MW	1.2 MW	1.4 MW	1.6 MW	1.8 MW	2.0 MW
DCS_70	Maximum prim voltage	127.0 V	124.0	124.7	124.8	125.0	125.1	125.2	125.3	125.5	125.6	125.7	125.8
DCS_60	Minimum prim voltage	117.0 V	123.2	123.2	123.3	123.3	123.3	123.3	123.3	123.4	123.4	123.4	123.4
DCS_10	Maximum feeder loading	90 %	18.7	16.5	14.5	13.2	11.9	11.5	11.5	11.5	11.5	11.5	11.5
DCS_55	Maximum conductor loading	90 %	16.0	16.0	16.0	16.0	16.2	19.7	23.3	26.9	30.6	34.2	37.8
DCS_50	Maximum transformer loading	90 %	16.1	14.8	13.4	12.1	10.8	9.5	8.3	7.1	6.0	5.2	4.6
DCS_20	Delta volts any section	3.6 V		0.1	0.3	0.4	0.6	0.7	0.9	1.0	1.1	1.3	1.4
DCS_21	Delta volts any reg	2.4 V		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
DCS_22	Delta volts any LTC	2.4 V											
DCS_23	Delta volts at gen	3.6 V		0.1	0.3	0.4	0.6	0.7	0.9	1.0	1.1	1.3	1.4
DCS_24	Delta volts all trip	3.6 V		0.1	0.3	0.4	0.6	0.7	0.9	1.0	1.1	1.3	1.4
DCS_30	Feeder reverse flow	90 %								5.2	6.9	8.9	10.9
DCS_32	Subtran reverse flow	90 %											
DCS_48	Conductor reverse flow	90 %	7.0	7.0	9.3	12.7	16.2	19.7	23.3	26.9	30.6	34.2	37.8
DCS_34	LTC wth co-gen reverse flow	15 %											
DCS_35	LTC no co-gen reverse flow	75 %											
DCS_36	Fixed tap tran reverse flow	90 %											
DCS_37	Regulator reverse flow	90 %	2.5	2.9	4.4	6.1	7.8	9.5	11.2	12.9	14.6	16.3	18.0
DCS_45	Manual switch reverse flow	90 %	0.1	0.1	0.1	0.1	0.1	0.1	0.1	3.4	4.5	5.8	7.1
DCS_46	Automatic switch reverse flow	90 %											
DCS_38	Fuse reverse flow	90 %	27.1	26.9	26.8	26.8	26.8	26.7	26.7	26.7	26.6	26.6	26.6
DCS_39	Hydraulic recloser reverse flow	0 %											
DCS_40	Electronic recloser reverse flow	90 %	11.2	11.1	11.1	11.1	11.1	11.1	11.1	11.0	11.0	11.0	11.4
DCS_41	Electronic fuse reverse flow	90 %											
DCS_42	Mechanical relay breaker reverse flow	0 %											
DCS_43	Electronic relay breaker reverse flow	90 %											
MET_10	Feeder kW demand		1363.8	1165.7	966.5	767.6	569.1	370.9	173.1	-24.4	-221.5	-418.3	-614.8
MET_20	Section kW into		-0.0	-200.0	-400.0	-599.9	-799.9	-999.8	-1199.7	-1399.6	-1599.5	-1799.3	-1999.2
MET_30	Section high volts		123.8	124.7	124.8	125.0	125.1	125.2	125.3	125.4	125.6	125.7	125.8
MET_40	Sub kW demand		2180.8	1982.8	1783.7	1585.0	1386.6	1188.6	990.9	793.5	596.5	399.8	203.4
MET_50	Sub pct pf		96.5	95.8	94.9	93.7	92.0	89.5	85.7	79.9	70.6	55.4	31.9
MET_60	Subtran tap												

Temperature Corrected Peak Load Screener Before Mitigations

Screen 2.00 MW at 100 pf on DER63100 POI			Maximum Value									
Code	Description	Limit	0.0 MW	0.2 MW	0.4 MW	0.6 MW	0.8 MW	1.0 MW	1.2 MW	1.4 MW	1.6 MW	1.8 MW	2.0 MW
!= dcs_													
DCS_70	Maximum prim voltage	127.0 V	124.9	125.1	125.3	125.4	125.6	125.8	126.0	126.1	126.3	126.4	126.6
DCS_60	Minimum prim voltage	117.0 V	119.9	119.9	120.0	120.0	120.1	120.1	120.1	120.2	120.2	120.3	120.3
DCS_10	Maximum feeder loading	90 %	83.8	81.5	79.2	76.9	74.7	72.4	70.2	68.3	66.9	65.6	64.3
DCS_55	Maximum conductor loading	90 %	69.2	65.9	62.5	59.2	56.0	55.6	55.6	55.6	55.6	55.6	55.6
DCS_50	Maximum transformer loading	90 %	78.8	77.4	76.0	74.7	73.3	71.9	70.5	69.1	67.8	66.4	65.1
DCS_20	Delta volts any section	3.6 V		0.2	0.4	0.6	0.8	1.0	1.1	1.3	1.5	1.7	1.9
DCS_21	Delta volts any reg	2.4 V		0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.3	1.5
DCS_22	Delta volts any LTC	2.4 V											
DCS_23	Delta volts at gen	3.6 V		0.2	0.4	0.6	0.8	1.0	1.1	1.3	1.5	1.7	1.9
DCS_24	Delta volts all trip	3.6 V		0.2	0.4	0.6	0.8	1.0	1.1	1.3	1.5	1.7	1.9
DCS_30	Feeder reverse flow	90 %											
DCS_32	Subtran reverse flow	90 %											
DCS_48	Conductor reverse flow	90 %	2.1	3.6	7.1	10.6	14.2	17.7	21.2	24.7	28.2	31.6	35.1
DCS_34	LTC wth co-gen reverse flow	15 %											
DCS_35	LTC no co-gen reverse flow	75 %											
DCS_36	Fixed tap tran reverse flow	90 %											
DCS_37	Regulator reverse flow	90 %					28.7	36.4	44.3	52.1	60.0	67.8	75.7
DCS_45	Manual switch reverse flow	90 %											
DCS_46	Automatic switch reverse flow	90 %											
DCS_38	Fuse reverse flow	90 %	14.6	14.6	14.6	14.6	14.6	14.5	14.5	14.5	14.5	14.5	14.5
DCS_39	Hydraulic recloser reverse flow	0 %					26.0	30.2	39.1	47.9	56.8	65.6	74.5
DCS_40	Electronic recloser reverse flow	90 %											5.4
DCS_41	Electronic fuse reverse flow	90 %											
DCS_42	Mechanical relay breaker reverse flow	0 %											
DCS_43	Electronic relay breaker reverse flow	90 %											
MET_10	Feeder kW demand		6560.7	6360.7	6161.1	5961.9	5763.0	5564.5	5366.4	5168.7	4971.3	4774.3	4577.6
MET_20	Section kW into		-0.0	-200.0	-400.0	-599.9	-799.9	-999.8	-1199.7	-1399.6	-1599.5	-1799.3	-1999.2
MET_30	Section high volts		124.7	124.9	125.0	125.2	125.4	125.6	125.7	125.9	126.1	126.2	126.4
MET_40	Sub kW demand		10771.4	10572.7	10374.3	10176.3	9978.7	9781.4	9584.4	9387.7	9191.4	8995.5	8799.9
MET_50	Sub pct pf		97.6	97.5	97.4	97.4	97.3	97.2	97.1	97.0	96.9	96.7	96.6
MET_60	Subtran tap												

Temperature Corrected Peak Load Screener After Mitigations

Screen 2.00 MW at 100 pf on DER63100 POI			Maximum Value									
Code	Description	Limit	0.0 MW	0.2 MW	0.4 MW	0.6 MW	0.8 MW	1.0 MW	1.2 MW	1.4 MW	1.6 MW	1.8 MW	2.0 MW
!= dcs_													
DCS_70	Maximum prim voltage	127.0 V	124.0	124.1	124.9	125.0	125.2	125.3	125.5	125.6	125.8	125.9	126.0
DCS_60	Minimum prim voltage	117.0 V	119.9	119.9	120.0	120.0	120.1	120.1	120.1	120.2	120.2	120.3	120.3
DCS_10	Maximum feeder loading	90 %	83.7	81.4	79.2	76.9	74.6	72.4	70.2	68.3	67.0	65.6	64.3
DCS_55	Maximum conductor loading	90 %	55.6	55.6	55.6	55.6	55.6	55.6	55.6	55.6	55.6	55.6	55.6
DCS_50	Maximum transformer loading	90 %	78.8	77.4	76.0	74.7	73.3	71.9	70.5	69.2	67.8	66.4	65.1
DCS_20	Delta volts any section	3.6 V		0.2	0.3	0.5	0.7	0.9	1.0	1.2	1.3	1.5	1.7
DCS_21	Delta volts any reg	2.4 V		0.1	0.3	0.4	0.5	0.7	0.8	0.9	1.1	1.2	1.3
DCS_22	Delta volts any LTC	2.4 V											
DCS_23	Delta volts at gen	3.6 V		0.2	0.3	0.5	0.7	0.9	1.0	1.2	1.3	1.5	1.7
DCS_24	Delta volts all trip	3.6 V		0.2	0.3	0.5	0.7	0.9	1.0	1.2	1.3	1.5	1.7
DCS_30	Feeder reverse flow	90 %											
DCS_32	Subtran reverse flow	90 %											
DCS_48	Conductor reverse flow	90 %	2.1	3.6	7.1	10.6	14.1	17.6	21.1	24.6	28.1	31.6	35.1
DCS_34	LTC wth co-gen reverse flow	15 %											
DCS_35	LTC no co-gen reverse flow	75 %											
DCS_36	Fixed tap tran reverse flow	90 %											
DCS_37	Regulator reverse flow	90 %					6.2	7.8	9.5	11.2	12.9	14.6	16.3
DCS_45	Manual switch reverse flow	90 %											
DCS_46	Automatic switch reverse flow	90 %											
DCS_38	Fuse reverse flow	90 %	14.6	14.6	14.6	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5
DCS_39	Hydraulic recloser reverse flow	0 %											
DCS_40	Electronic recloser reverse flow	90 %						3.8	4.9	6.0	7.1	8.2	9.3
DCS_41	Electronic fuse reverse flow	90 %											
DCS_42	Mechanical relay breaker reverse flow	0 %											
DCS_43	Electronic relay breaker reverse flow	90 %											
MET_10	Feeder kW demand		6558.8	6359.3	6161.3	5962.4	5763.9	5565.7	5367.8	5170.2	4972.9	4775.9	4579.2
MET_20	Section kW into		-0.0	-200.0	-400.0	-599.9	-799.9	-999.8	-1199.7	-1399.6	-1599.5	-1799.3	-1999.2
MET_30	Section high volts		124.3	124.5	124.7	124.8	125.0	125.2	125.3	125.5	125.7	125.8	126.0
MET_40	Sub kW demand		10769.5	10571.3	10374.6	10176.9	9979.6	9782.5	9585.7	9389.2	9193.0	8997.0	8801.3
MET_50	Sub pct pf		97.6	97.5	97.4	97.4	97.3	97.2	97.1	97.0	96.9	96.7	96.6
MET_60	Subtran tap												

Y N

☐ ☒ Does the proposed DER cause objectionable rapid voltage changes? (Are the voltage drops and rises within acceptable limits? *Less than 3% (3.6V on 120V base) fluctuation is acceptable for all line segments without regulators, based on the updated IEEE 1547 Rapid Voltage Change Criteria. For line segments with voltage regulators, less than 2% (2.4V on 120V base) fluctuation is acceptable).*

Explain: **Voltage changes stays within 3% before any mitigations. After mitigating conductor overloads, the voltage change percentage lowers even further.**

Screener Reference Information (explanation of values flagged red):

If a project fails due to RVC, you can use the screeners above to help determine at what size the DER will not create RVC. Review lines DCS_20 through DCS_24 for results that do not exceed the limits noted. *A more detailed, size specific analysis will not be conducted in this study.*

System Protection:

Provide the fault current at the POI including the contribution from the DER:

L-G Fault Current	3-Phase Fault Current	L-L Fault Current
2578	3131	2724

NOTE: This information provided in this study is subject to change as result of normal utility operations. This may include the replacement of various distribution feeder devices as well as circuit configuration development to serve new loads. Additionally, this calculated fault current does not include any contributions by customer motors, either upstream or downstream of the service connection point, or fault current asymmetry. This fault calculation accounts for the current utility contribution only.

Select the appropriate protective device needed at the POI from the list below:

☒ IntelliRupter	☐ Fuse Link (list size): _____	☐ No new protection needed

List any coordination changes required to maintain coordination with the new fuse: **N/A**

Y N

☒ ☐ Are there any hydraulic reclosers upstream of the proposed DER? (The nominal reclose time of these hydraulic devices is 2 seconds, but they may reclose too quickly due to the nature of the hydraulic mechanism. They will need either to be relocated or upgraded to an electronically controlled device)

List any upstream hydraulic reclosers and mitigation actions:

Line recloser 823-2 will need to be replaced with an Intellirupter

☐ ☒ Does the fault current contribution from the DER cause any protective device to exceed its interrupting rating? If so, please list affected devices and mitigation strategies below:

☐ ☒ Is the proposed POI on a circuit with an active or planned Distribution Automation scheme?

☐ ☐ If the answer to the above question is "yes," are there any concerns or changes noted by the Distribution Automation team?

☐ ☒ Are there concerns or changes noted by the System Protection Engineer?

☐ ☒ Are any upgrades triggered by exceeding 2/3 minimum load on the sub-transmission system?

Explain: **No changes noted from System Protection.**

Interconnection Requirements:

Y N

☒ ☐ Is there an existing IntelliNode on the substation protective device?

☒ ☐ Is an IntelliNode required on the substation protective device?

☒ ☐ Is there a lockable disconnect (gang operated if 3-phase) on the DER proposed one-line?

☒ ☐ Is the inverter being used compliant with IEEE 1547 and UL 1741?

☐ ☒ Is the proposed DER BTM?

Interactions with Other Feeder Devices:

Y N

☐ ☒ Are any voltage or current controlled capacitor banks affected by the DER?

☐ ☒ Are any Regulators or Transformer LTCs with Load Drop Compensation (R and X settings) affected by the DER?

☐ ☐ Will SCADA capability on upstream voltage regulators be required for this installation? *(Line and substation regulators upstream of the DER POI that experience reverse power flow due to the DER require Eaton CL7 controllers (or newer) along with a SCADA communication package if the device is not currently equipped with SCADA due to VO. Substation LTCs that experience reverse power flow due to the DER will also need to be capable of being set to a co-generation mode and be equipped with SCADA if they are not currently.)*

*If there are any regulators upstream of the DER, reverse settings need to be included in the design.

Line regulator 823-2 will need the settings changed to bias co-gen with locked reverse mode settings.

☐ ☒ Are there any other concerns not mentioned previously that would prevent the installation of the proposed DER from moving forward?

Explain:

Explain and list required facility upgrades or installations and Costs:

POI work required for interconnection
Equipment needed at the POI: ☒ ITR ☒ Primary metering ☒ Tap, poles and wires.

☐ ITN for BTM SCADA Metering(if on a DA Scheme) ☐ CT / PT Cabinet Installed

Line work required for interconnection
Line equipment upgrades: ☒ Line Recloser to ITR 823-2

Line conductor upgrades: Upgraded size: ☐ 1/0AAAC ☐ 336ACSR ☒ 556AAC
upgraded location from Pole 2490467 to Pole 2490464

Substation work required for interconnection
Substation upgrades: ☐ Viper ☐ ITN ☐ Regulator ☐ CL7 controls
☐ Transformer ☐ Other

System Protection work required for interconnection
No changes noted from System Protection

Summary of all the upgrades needed to interconnect:

POI:

• Install Intellirupter, solid blade switches and primary metering along with the necessary poles and wires

Line Upgrades:

• Reconductor using 556AA from the Pole 2490467 to Pole 2490464 (≈1,000') Built under 34kV line for the entire distance.

• Replace line recloser 823-2 with an Intellirupter

Y **N**

☒ ☐ Are there any other factors that would impact the cost or project timeline for the DER installation (Ex: Railroad permits, crops out, non-summer loads for switching, significant construction required, Easements required, long lead-time items, etc.)

Explain:

-Real estate easements may be required at an additional cost not included in this estimate.

-Forestry, permitting, flagging and any unforeseen circumstances may also arise that require an additional cost not included in this estimate.

-Long lead times for material procurement.

If there are generation projects ahead in queue that require system upgrades prior to the interconnection of this Project, this Project is subject to incurring these costs in the event that projects ahead in queue withdraw.

Interconnection Costs

The estimated total cost to interconnect to Ameren's electric distribution system includes all required interconnection facility and system upgrades of which Ameren is responsible for procuring the dollar amount. This is an estimated cost based on available information. If the Customer deems these costs acceptable along with the results of the study, then the Customer may request a detailed cost estimate as part of the facilities study to continue the study process. The estimate provided in this study is not final and is subject to change during the detailed cost estimate process. All costs provided to the Customer are subject to change through sequential studies, engineering design, procurement, and construction.

Required Interconnection Facilities	Reference	Count (each or miles)	Material	Labor	Overhead	Cost
Distribution						
Standard POI Installation	Distribution	1	20%	70%	10%	$ 192,000
4/12 kV Line Reconductoring	Distribution	0.19	20%	70%	10%	$ 149,000
4/12 kV ITR	Distribution	1	46%	38%	16%	$ 150,000
DA Cost Summary						
ITR w/ Cell Programming	Distribution Automation	2	41%	59%	0%	$ 9,000
Subtotal						$ 500,000.00
Tax Gross Up						$ 86,000.00
Estimated Total Cost						$ 586,000.00

Note: Estimated Total Cost is rounded to the nearest $1,000 due to being an estimated value. This does not mean this estimate is accurate within the $1,000 range.

If the Customer accepts the results of this study and agrees to the scope of the interconnection facilities and system upgrades, then the Customer may elect to proceed with a Detailed Cost Estimate and agrees to forfeit the one-time downsize option.

If the Customer chooses to exercise the one-time downsize, then the Customer determines the new, smaller application size and updates all documentation within 15 business days for Ameren to reevaluate or application will be automatically withdrawn.

Generation projects ahead in queue and their required system upgrades:

DER-36686 $579,000 Cost of upgrades

Replace line recloser 823-4 with an Intellirupter, Viper and ITN at F823, Lightning arresters (3) 69kV and Below, LOR and Rework Sub-T bus protection, & Mobilization

Interconnection Schedule

Conditions and Constraints

The lead time to order and install the required facilities is 12-18 months from the time the Customer provides Ameren with the security and prepayment under milestones in the below. The overall lead time is also affected by the actual project timing and schedule. Ameren will avoid construction that will require taking facilities out of service during peak summer months and peak winter months.

Ameren requires at least one month notice before testing and startup to alert and schedule Ameren field personnel to witness on site Customer's tests. Ameren is only concerned with those items related to the interface requirements.

Milestones	Description	Date
1	Customer to provide Ameren security deposit for Ameren's Interconnection Facilities and System Upgrades.	Date of payment
2	Ameren begins design and equipment procurement.	+15 days
3	Ameren begins construction.	+15 days
4	Ameren completion of metering installation on meter pole.	+18 months
5	Ameren completes construction of the Interconnection Facilities and System Upgrades.	+18 months
6	Generator step-up transformers receive back feed power.	+15 days
7	Generation testing. Ameren performs witness test with Customer.	+15 days
8	Commercial operation date.	+30 days
9	Ameren provides Customer with final accounting report.	+3 months

The description and date entries listed are provided solely for the convenience of the Customer and Ameren in establishing their applicable milestones. The failure of Ameren to meet any date on this milestone schedule shall not result in any liability on the part of Ameren if such failure is not the result of the negligence or willful misconduct of Ameren.

This timeline assumes no long lead time material orders are required to complete construction. If material is required that has long lead times, those additional times will be added to the overall timeline of the project.

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Appendix C:

Preliminary Stormwater Pollution Prevention Plan (SWPPP)

PRELIMINARY

STORMWATER POLLUTION PREVENTION PLAN

(SWPPP)

ELM LAWN SOLAR PARK

2.00 MWAC Ground-Mounted Solar Photovoltaic Facility

Montgomery County, Illinois

NPDES Permit No. ILR10 (General Permit)

Prepared For:	SDG IL DG, LLC
Engineer:	Uneclipsed Energy, PLLC
Parcel ID:	10-34-100-019
Coordinates:	39.184294, -89.632000
Date:	March 2026
Status:	PRELIMINARY

Table of Contents

Appendix: NRCS Custom Soil Resource Report for Montgomery County, Illinois

1. Project Overview and Site Description

1.1 Project Summary

This Preliminary Stormwater Pollution Prevention Plan (SWPPP) has been prepared for the Elm Lawn Solar Park project in Montgomery County, Illinois. The plan is designed to satisfy requirements of the Illinois Environmental Protection Agency (IEPA) General NPDES Permit No. ILR10 for Storm Water Discharges from Construction Site Activities, and to comply with applicable provisions of the Montgomery County Solar Ordinance (Sixth Revision, October 14, 2025).

The Elm Lawn Solar Park is a 2.00 MWAC (3.0 MWDC) ground-mounted photovoltaic solar energy facility to be constructed on property owned by Elm Lawn Memorial Park Inc. The project will use approximately 5,040 solar modules mounted on single-axis tracker racking systems oriented east-west.

Item	Detail
Project Name	Elm Lawn Solar Park
Developer	ESA Solar Energy, LLC
Engineer	Uneclipsed Energy, PLLC (Maitland, FL 32751)
Location	Montgomery County, Illinois
Address	173 Yaeger Lake Trail, Litchfield, IL 62056
Point of Interconnection	39.184294, -89.632000
Parcel ID	10-34-100-019
Owner	Elm Lawn Memorial Park Inc.
Parcel Area	28.65 Acres
Project Area	11.51 Acres
System Capacity	2.0 MWAC / 3.0 MWDC
Module Count (Approx.)	5,040
Racking System	Single Axis Trackers
Module Tilt	+/- 55 Degrees
Module Orientation	East/West (Az. 90°/270°)
Module Height (Max Tilt)	~10 ft
Basis of Design	QCells Q.Peak Duo XL-G11S.3 / BiFi 600W
POI Feeder	Litchfield N95-823 (Ameren)
System Voltage	12.47kV, 4-wire wye
Substation	139423 (approx. 2.0 mi. from site)

1.2 Site Location and Description

The project site is located along E. Clark Street, west of Yaeger Lake Trail, in the Litchfield area of Montgomery County, Illinois. The property is currently used as open land associated with the adjacent Elm Lawn Cemetery. The site is generally flat with gentle grades. Existing vegetative buffers are present along portions of the northern boundary. Wetland features have been identified on the northeast corner of the parcel and will be protected and avoided during construction.

The project area is divided into two panel areas: Panel Area #1 to the north and Panel Area #2 to the south, separated by an internal access drive. Access to the site will be from E. Clark Street via a 20-foot-wide entrance with a gravel surface. The site will be enclosed by an 8-foot-high woven wire fence set a minimum of 50 feet from all public rights-of-way and adjacent property lines.

Adjacent land uses include residential properties, agricultural parcels, the Elm Lawn Cemetery, and Yaeger Lake Trail to the east. The nearest substation (Substation 139423) is approximately 2.0 miles from the site.

1.3 Regulatory Framework

This SWPPP has been developed in accordance with the following regulatory requirements:

- Illinois General NPDES Permit No. ILR10 for Storm Water Discharges from Construction Site Activities
- Clean Water Act (CWA) Section 402, National Pollutant Discharge Elimination System (NPDES)
- Illinois Environmental Protection Act (415 ILCS 5)
- Illinois Pollution Control Board Regulations: 35 IAC Subtitle C (Water Pollution)
- Montgomery County Ordinance for Solar Energy Farm and Solar Garden Installations (Sixth Revision, October 14, 2025)
- Illinois Department of Agriculture Standard Agricultural Impact Mitigation Agreement (AIMA)
- 55 ILCS § 5/5-12020 Commercial Solar Energy Facilities

2. Existing Site Conditions

2.1 Topography and Drainage

The project site is situated on upland terrain typical of the till plains of central Illinois. Contour mapping (Sheet C101) indicates the site has gentle to moderate relief, with 1-foot contour intervals and a general base elevation of approximately 210 feet. Site slopes are predominantly 0 to 5 percent across the panel areas, with steeper slopes of up to 18–35 percent along the northeast boundary where the Hickory silt loam (8F) unit is present.

Existing drainage generally flows from a gentle “ridge” running north/south through the center of the site, sheeting to the northeast on the east side and southwest on the west side. A preliminary stormwater management feature is identified on the site plan in the northeast area of the project. Wetland features are located along the northeast margin of the parcel and will be avoided with appropriate buffers maintained.

2.2 Soils

A Custom Soil Resource Report was obtained from the USDA Natural Resources Conservation Service (NRCS) for the project area. The report identifies four soil map units within the 32.4-acre area of interest (includes the parcel and parcel context):

Symbol	Soil Name	Acres	% of AOI	HSG	Slope
8F	Hickory silt loam	0.6	1.9%	B	18–35%
581B	Tamalco silt loam	1.0	3.2%	D	2–5%
582B	Homen silt loam	5.2	16.2%	C	2–5%
993A	Cowden-Piasa silt loams	25.5	78.7%	C/D	0–2%
	Total	**32.4**	**100.0%**		

2.2.1 Cowden-Piasa Silt Loams (993A) Dominant Soil

Comprising 78.7% of the area of interest, the Cowden-Piasa silt loams are the dominant soil on site. These soils are found on uplands with 0 to 2 percent slopes on ground moraines. Key characteristics include poorly drained conditions with a depth to water table of approximately 0 to 12 inches, frequent ponding, and a Hydrologic Soil Group of C/D. The saturated hydraulic conductivity (Ksat) of the most limiting layer is moderately low to moderately high (0.06 to 0.20 in/hr for Cowden) and low to moderately low (0.01 to 0.06 in/hr for Piasa). The Cowden component has a hydric soil rating of Yes. The typical profile consists of silt loam (0–8 in.), silt loam (8–19 in.), silty clay loam (19–50 in.), and silt loam (50–79 in.).

Erosion and sediment control BMPs must account for the slow infiltration rates and high ponding potential of these soils, particularly during wet seasons.

2.2.2 Homen Silt Loam (582B)

Covering 16.2% of the area, Homen silt loam occurs on uplands and till plains with 2 to 5 percent slopes. It is moderately well drained with a water table at approximately 18 to 42 inches and HSG C.

The Ksat is moderately low to moderately high (0.06 to 0.20 in/hr). The typical profile includes silt loam over silty clay loam with a fragipan-like layer (2Btx) at 42 to 77 inches. All areas are classified as prime farmland.

2.2.3 Tamalco Silt Loam (581B)

Comprising 3.2% of the area, this soil is found on knolls on ground moraines with 2 to 5 percent slopes. It is moderately well drained with a natric restrictive feature at 12 to 24 inches. The Ksat of the most limiting layer is very low (0.01 to 0.06 in/hr), and the HSG is D. Depth to water table is about 17 to 36 inches. This soil is classified as farmland of statewide importance.

2.2.4 Hickory Silt Loam (8F)

Present on only 1.9% of the area along the northeast boundary, Hickory silt loam has steep slopes of 18 to 35 percent. It is well drained with HSG B and a high runoff class. This area will be excluded from grading and construction activities. The existing vegetative buffer in this zone will be maintained.

2.3 Hydrology and Receiving Waters

The site is located within the Shoal Creek watershed in the lower Illinois River basin. Stormwater runoff from the project site drains generally toward the northeast and southeast. Wetland features have been identified on the northeast portion of the parcel and are shown on the site plan. These features will be avoided, and appropriate buffer distances will be maintained in accordance with applicable regulations.

The project design includes a preliminary stormwater management basin located in the northeast area of the site to attenuate post-construction peak runoff rates and volumes. The nearest named receiving water is Shoal Creek, which is part of the larger Kaskaskia River watershed.

2.4 Existing Vegetation and Land Cover

The majority of the parcel is currently in open/mowed condition with a history of managed ground cover. Existing mature vegetative buffers are present along portions of the north and northeast boundaries and will be preserved. The project includes provisions for 20-foot-wide landscaping buffers (Type A) along the north and south perimeters, 10-foot-wide landscaping buffers (Type B) along internal boundaries, and a dedicated habitat and pollinator buffer zone.

3. Construction Activities and Sequence

3.1 Nature of Construction

The Elm Lawn Solar Park involves the construction of a ground-mounted photovoltaic solar facility. Primary construction activities that may result in land disturbance include:

- Seeding and stabilization with native and pollinator-friendly vegetation
- Rough grading for access drives, equipment pads, and stormwater management features
- Installation of perimeter fencing (8-foot woven wire fence)
- Driving of steel piles for single-axis tracker racking foundations
- Trenching for underground electrical conduit and cabling
- Construction of gravel access roads (16-foot typical width, crowned or sloped at 2%–4%)
- Installation of pad-mounted equipment (inverters, transformers, switchgear, metering)
- Stormwater basin construction (if required)

3.2 Construction Sequence

The anticipated construction sequence is as follows:

1. Pre-Construction: Install construction entrance, perimeter erosion controls (silt fence, fiber rolls), and construction staging/laydown area.
2. Site Preparation: Light grading and preconstruction seeding/native ground cover establishment; install temporary sediment and erosion control features as needed.
3. Rough Grading: Grade access roads and equipment pad areas; construct permanent stormwater management features, as needed.
4. Foundation Installation: Drive steel piles for racking; pour concrete pads as required for inverters and equipment.
5. Electrical Trenching: Install underground conduit and cabling; backfill and compact trenches; restore topsoil.
6. Racking and Module Installation: Assemble tracker structures; mount PV modules.
7. Electrical Completion: Install inverters, transformers, switchgear, and metering equipment; complete interconnection in coordination with Ameren.
8. Final Stabilization: Re-seed all disturbed areas with approved native and/or pollinator-friendly seed mixes; install permanent vegetative buffers; remove temporary erosion controls once vegetation is established.

3.3 Estimated Disturbed Area

The total project area within the fence line is approximately 11.51 acres. The total estimated area of land disturbance during construction is no greater than 15 acres, accounting for access roads, equipment pads, trenching corridors, and grading areas. Because the total disturbed area exceeds 1 acre, coverage under the IEPA ILR10 General NPDES Permit is required.

4. Erosion and Sediment Control Best Management Practices

The following structural and non-structural BMPs will be implemented during construction to minimize erosion and the discharge of sediment and other pollutants from the site. BMPs have been selected to address the specific soil conditions at the site, particularly the poorly drained Cowden-Piasa silt loams and the moderate infiltration limitations of the Homen and Tamalco soils.

4.1 Perimeter Controls

- Silt Fence: A continuous silt fence barrier shall be installed along all downslope perimeter boundaries of active work areas prior to any land-disturbing activities. Silt fence shall be properly trenched into the soil and staked at a maximum of 6-foot intervals. Particular attention shall be given to the eastern and southeastern perimeters, which are downgradient toward wetland features and receiving waters.
- Fiber Rolls / Compost Socks: Supplemental fiber rolls (minimum 12-inch diameter) or compost socks shall be placed along the perimeter of wetland buffer areas and at the toe of any slopes exceeding 3:1.
- Vegetative Buffer Preservation: The existing vegetative buffer along the northern boundary shall be maintained throughout construction to provide natural filtration of runoff. A minimum 50-foot buffer shall be maintained from identified wetland features.

4.2 Erosion Controls

- Soil Stabilization: All disturbed areas that will remain inactive for 14 or more consecutive days shall be temporarily stabilized with erosion control blankets, hydraulic mulch, or temporary seeding appropriate for the season.
- Topsoil Management: Minimal impacts to topsoil are necessary. Any stripped soil shall be stockpiled separately from subsoil in designated areas and protected with silt fence. Stockpiles shall be seeded or covered if inactive for more than 14 days. Best efforts shall be made to store topsoil near the excavation site to prevent mixing with subsoil materials, consistent with AIMA requirements.
- Slope Protection: On slopes exceeding 3:1, erosion control blankets (biodegradable) shall be installed on all exposed surfaces within 7 days of final grading. The steep Hickory silt loam area (8F, 18–35% slopes) along the northeast boundary is excluded from disturbance, and existing vegetation will be preserved.
- Dust Control: Water trucks or other approved dust suppressants shall be used as necessary to minimize airborne particulates from exposed soils and unpaved roads during dry conditions.

4.3 Sediment Controls

- Sediment Traps/Basins: Temporary sediment traps shall be installed at low points within the site and at discharge points prior to the completion of permanent stormwater management features.

- Inlet Protection: All existing and proposed storm drain inlets or catch basins within or adjacent to the site shall be protected with filter fabric, gravel bags, or proprietary inlet protection devices.
- Construction Entrance: A stabilized construction entrance consisting of a minimum 6-inch depth of crushed aggregate on geotextile fabric shall be installed at the E. Clark Street access point. The entrance shall be a minimum of 20 feet wide. Vehicle tracking pads or wash racks shall be utilized if tracking of sediment onto public roads occurs.
- Check Dams: Temporary rock check dams shall be installed in any temporary swales or drainage channels on site to reduce flow velocity and promote sediment deposition.

4.4 Post-Construction Stormwater Controls

- Permanent Stormwater Basin: A permanent stormwater management basin may be constructed in the northeast portion of the site as shown on Sheet G101. The basin shall be designed to attenuate post-development peak discharge rates to pre-development levels for the 2-year through 100-year design storm events.
- Vegetated Swales: Permanent vegetated swales may established along internal access roads and panel row drainage corridors to convey runoff at non-erosive velocities.
- Pollinator Habitat and Ground Cover: All areas beneath and between solar panel arrays shall be established with a native, seed mix per IDNR recommendations. This permanent ground cover will provide long-term erosion protection and enhanced infiltration throughout the operational life of the facility.

5. Good Housekeeping and Pollution Prevention Measures

5.1 Materials Management

- All construction materials, including fuels, oils, lubricants, and chemicals, shall be stored in designated staging areas with secondary containment.
- Hazardous materials storage areas shall be located a minimum of 50 feet from wetlands, drainage features, and stormwater management facilities.
- Material Safety Data Sheets (SDS) shall be maintained on site for all chemicals stored or used.
- Portable fuel tanks and refueling areas shall be equipped with spill containment berms or trays.

5.2 Waste Management

- Construction debris, including packaging, unused materials, and solid waste, shall be collected and disposed of in designated containers and removed from the site regularly.
- Portable sanitary facilities shall be provided and maintained in proper working order.
- Concrete washout shall be conducted in designated lined washout areas only. Washout water shall not be discharged to the ground surface, drainage features, or stormwater facilities.
- No construction debris or excess soil shall be disposed of in wetland areas or buffers.

5.3 Spill Prevention and Response

A spill prevention and response plan shall be maintained on site. In the event of a spill of fuel, oil, hydraulic fluid, or other hazardous material:

- Stop the source of the spill immediately.
- Deploy absorbent materials (pads, booms, granular absorbent) to contain the spill.
- Notify the site superintendent and environmental compliance manager immediately.
- Report spills exceeding reportable quantities to the IEPA and the National Response Center as required.
- Document the spill event, response actions, and corrective measures in the SWPPP inspection log.

5.4 Vehicle and Equipment Management

- All vehicles and equipment shall be inspected regularly for fluid leaks.
- Vehicle maintenance and washing shall be conducted only in designated areas with appropriate containment.
- Equipment shall be parked on designated impervious pads or existing gravel areas when not in active use.

6. Inspection and Maintenance Requirements

6.1 Inspection Schedule

The SWPPP shall be inspected by a qualified individual in accordance with the IEPA ILR10 General Permit requirements:

- Routine inspections shall be conducted at least once every seven (7) calendar days.
- Additional inspections shall be conducted within 24 hours following any rainfall event producing 0.5 inches or more of precipitation in a 24-hour period.
- Inspections shall also be conducted following any event that causes significant damage to erosion or sediment controls.

6.2 Inspection Scope

Each inspection shall include, at a minimum:

- Visual assessment of all perimeter erosion and sediment controls (silt fence, fiber rolls, construction entrance).
- Inspection of temporary and permanent sediment basins for accumulated sediment, structural integrity, and outlet condition.
- Assessment of all exposed soil areas for evidence of rill or gully erosion.
- Verification that all stockpiles are properly contained and stabilized.
- Inspection of all drainage channels, swales, and stormwater conveyance features.
- Evaluation of the condition of the stabilized construction entrance and identification of any sediment tracking onto public roads.
- Assessment of all materials storage and waste disposal areas for signs of spills or leaks.
- Verification of wetland buffer integrity and absence of encroachment.

6.3 Maintenance and Corrective Actions

Any deficiencies identified during inspections shall be corrected as follows:

- Damaged or undercut silt fence shall be repaired or replaced within 24 hours of discovery.
- Sediment accumulation against silt fence exceeding one-third of the fence height shall be removed promptly.
- Sediment basins and traps shall be cleaned out when sediment accumulation reaches 50% of design storage capacity.
- Any breach or failure of erosion controls shall be repaired immediately, and supplemental controls shall be installed as needed.
- Tracking of sediment onto public roads shall be addressed within 24 hours by sweeping and/or enhancing the construction entrance.

6.4 Documentation

All inspection findings shall be documented in written inspection reports maintained on site as part of the SWPPP. Each report shall include the date and time of inspection, name of inspector, weather conditions, a description of all BMPs observed, identification of any deficiencies, and corrective actions taken or scheduled. Inspection reports shall be retained for a minimum of three (3) years following the filing of the Notice of Termination (NOT).

7. SWPPP Amendments and Permit Termination

7.1 Amendments

This SWPPP is a living document and shall be amended whenever:

- There is a change in design, construction, operation, or maintenance that materially affects the potential for discharge of pollutants.
- Inspections or investigations reveal that the SWPPP is not effective in controlling pollutant discharges.
- Additional or modified BMPs are needed to address site conditions not anticipated in the original plan.
- The IEPA or other regulatory agency requires modifications.

All amendments shall be documented with the date, nature of the change, and the name of the person authorizing the amendment.

7.2 Final Stabilization and Permit Termination

A Notice of Termination (NOT) shall be filed with the IEPA upon achievement of final stabilization. Final stabilization is considered achieved when:

- All land-disturbing activities are complete.
- A uniform perennial vegetative cover with a density of at least 70% of the natural background cover has been established on all unpaved and un-armored areas.
- All temporary erosion and sediment controls have been removed.
- All permanent stormwater management features are constructed and functioning as designed.

For the Elm Lawn Solar Park, final stabilization will be achieved through establishment of native pollinator-friendly ground cover beneath and between all panel arrays, permanent vegetative buffer plantings, and stabilization of all access road shoulders and stormwater conveyance features.

8. Wetland and Environmental Protections

8.1 Wetland Avoidance

Wetland features identified on the northeast portion of the project parcel shall be avoided during all phases of construction. The following protective measures shall be implemented:

- A minimum 50-foot construction setback buffer shall be maintained from all delineated wetland boundaries.
- Wetland buffer areas shall be marked with high-visibility fencing or flagging prior to the start of construction.
- No equipment staging, material storage, soil stockpiling, or land-disturbing activities shall occur within the wetland buffer.
- Redundant perimeter sediment controls (silt fence plus fiber rolls) shall be installed along the wetland buffer boundary.

8.2 Drainage Tile Protection

Consistent with the AIMA requirements and Montgomery County ordinance, the following measures shall be taken to protect agricultural drainage infrastructure:

- Prior to construction, the Applicant shall work with the landowner to identify drainage tile lines traversing the property to the extent reasonably practicable, depicting all identified tile lines on the construction plans.
- Tile line locations shall be recorded using GPS technology.
- Any damaged drainage tile lines shall be repaired promptly using materials of equal or greater quality.
- As-built drawings showing the locations of all encountered drainage tile lines and repair locations shall be compiled and distributed to the landowner and IDOA.

8.3 Endangered Species and Ecological Compliance

The project shall undergo natural resource review through the IDNR EcoCAT (Ecological Compliance Assessment Tool) process for endangered species and wetlands, as committed in the project general notes (Sheet G002). Any recommendations or conditions resulting from the EcoCAT review shall be incorporated into this SWPPP and the project construction plans.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Montgomery County, Illinois

March 11, 2026

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

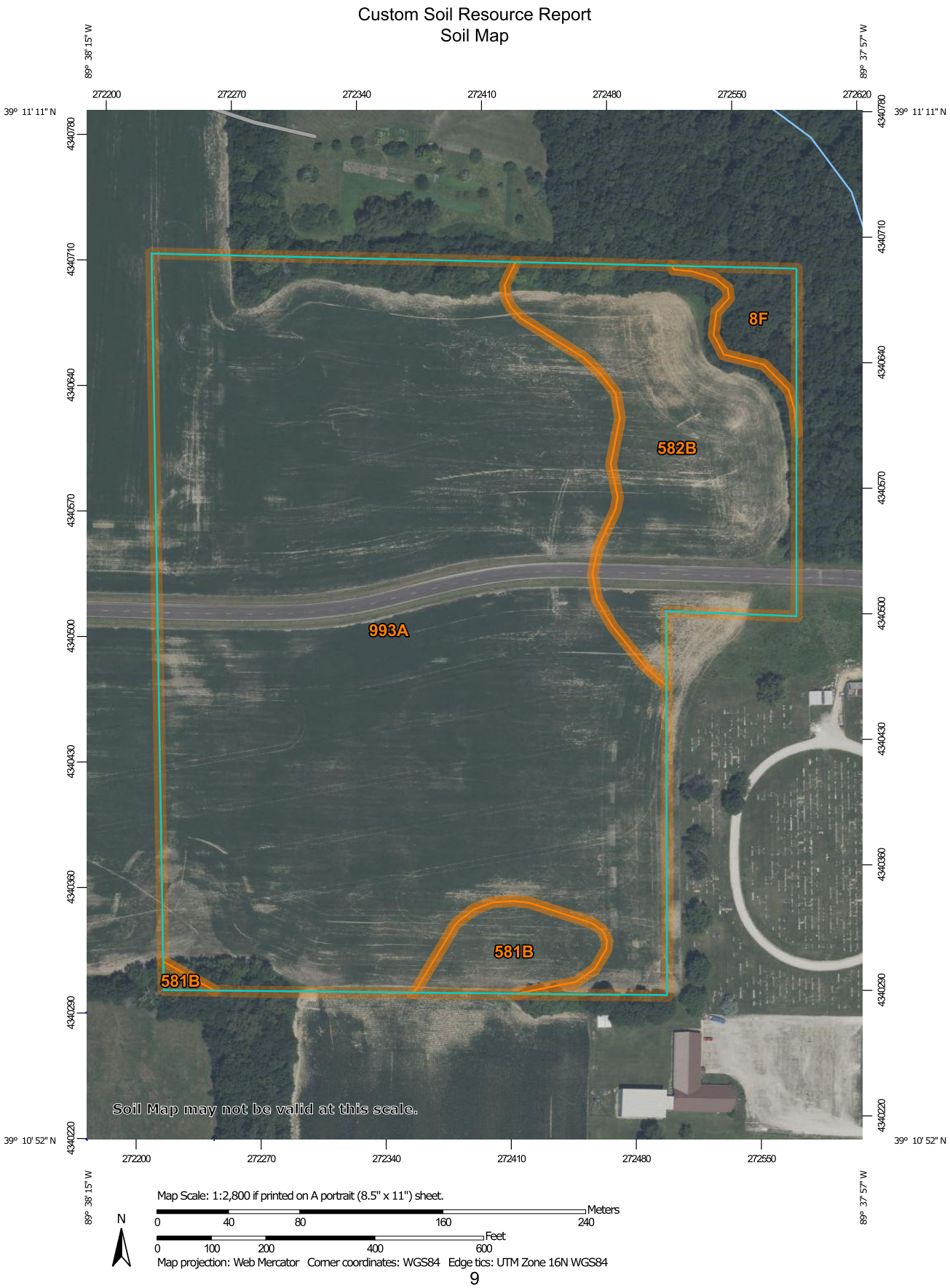
While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


Custom Soil Resource Report
Soil Map
89° 38' 15" W
89° 37' 57" W
272200
272270
272340
272410
272480
272550
272620
39° 11' 11" N
4340780
4340710
4340640
4340570
4340500
4340430
4340360
4340290
4340220
39° 10' 52" N
8F
582B
993A
581B
581B
Soil Map may not be valid at this scale.
Map Scale: 1:2,800 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0
40
80
160
240
Feet
0
100
200
400
600
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

9

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Montgomery County, Illinois
Survey Area Data: Version 22, Aug 31, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 10, 2023—Sep 10, 2023

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8F	Hickory silt loam, 18 to 35 percent slopes	0.6	1.9%
581B	Tamalco silt loam, 2 to 5 percent slopes	1.0	3.2%
582B	Homen silt loam, 2 to 5 percent slopes	5.2	16.2%
993A	Cowden-Piasa silt loams, 0 to 2 percent slopes	25.5	78.7%
Totals for Area of Interest		**32.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Montgomery County, Illinois

8F—Hickory silt loam, 18 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2yb19
Landscape: Till plains
Elevation: 370 to 680 feet
Mean annual precipitation: 39 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 185 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Hickory and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hickory

Setting

Landscape: Till plains
Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy till

Typical profile

A - 0 to 4 inches: silt loam
E - 4 to 12 inches: loam
Bt1 - 12 to 26 inches: clay loam
Bt2 - 26 to 46 inches: clay loam
Bt3 - 46 to 60 inches: clay loam

Properties and qualities

Slope: 18 to 35 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F113XY911IL - Loamy Till Backslope Forest

Hydric soil rating: No

Minor Components

Ava

Percent of map unit: 5 percent
Landscape: Loess covered till plains
Landform: Convex ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F113XY910IL - Fragic Backslope Woodland
Hydric soil rating: No

Atlas, eroded

Percent of map unit: 3 percent
Landscape: Till plains
Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F114XB502IN - Wet Till Upland Forest
Hydric soil rating: No

Belknap, frequently flooded

Percent of map unit: 2 percent
Landscape: River valleys
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F113XY919IL - Wet Silty Floodplain Forest
Hydric soil rating: No

581B—Tamalco silt loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 1vsdp
Elevation: 340 to 1,360 feet
Mean annual precipitation: 35 to 48 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 180 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Tamalco and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tamalco

Setting

Landform: Knolls on ground moraines
Landform position (two-dimensional): Summit, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess

Typical profile

A - 0 to 6 inches: silt loam
E - 6 to 9 inches: silt loam
Bt1 - 9 to 17 inches: silty clay
Bt2 - 17 to 42 inches: silty clay loam
2C - 42 to 84 inches: silt loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 12 to 24 inches to natric
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 17 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 25.0
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: R113XY902IL - Natric Till Plain Savanna
Hydric soil rating: No

582B—Homen silt loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2tp1c
Landscape: Uplands
Elevation: 350 to 980 feet
Mean annual precipitation: 37 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Homen and similar soils: 90 percent

Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Homen

Setting
Landscape: Uplands
Landform: Till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Peoria loess over roxana loess

Typical profile
Ap - 0 to 9 inches: silt loam
E - 9 to 14 inches: silt loam
Bt - 14 to 42 inches: silty clay loam
2Btx - 42 to 77 inches: silt loam
2Bt - 77 to 79 inches: silt loam

Properties and qualities
Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F114XB803IN - Wet Silty Eolian Forest
Hydric soil rating: No

Minor Components

Marine
Percent of map unit: 10 percent
Landscape: Uplands
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F114XB803IN - Wet Silty Eolian Forest
Hydric soil rating: No

993A—Cowden-Piasa silt loams, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tbs0
Landscape: Uplands
Elevation: 330 to 840 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Cowden and similar soils: 50 percent
Piasa and similar soils: 48 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cowden

Setting

Landscape: Uplands
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 8 inches: silt loam
Eg - 8 to 19 inches: silt loam
Btg - 19 to 50 inches: silty clay loam
Cg - 50 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 17 to 21 inches to abrupt textural change
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water supply, 0 to 60 inches: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R113XY903IL - Wet Upland Prairie
Hydric soil rating: Yes

Description of Piasa

Setting

Landscape: Uplands
Landform: Depressions, Ground moraines
Landform position (two-dimensional): Toeslope, summit
Landform position (three-dimensional): Interfluve, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over silty pedisediment

Typical profile

Ap - 0 to 8 inches: silt loam
Eng - 8 to 12 inches: silt loam
Btng - 12 to 48 inches: silty clay loam
2BCng - 48 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 11 to 14 inches to natric
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 20.0
Available water supply, 0 to 60 inches: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: R114XB901IN - Sodium Affected Uplands
Hydric soil rating: Yes

Minor Components

Darmstadt

Percent of map unit: 2 percent
Landscape: Till plains
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R113XY902IL - Natric Till Plain Savanna
Hydric soil rating: No

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D

Appendix D:

Decommissioning Plan

Solar PV Decommissioning Plan

Prepared for: SDG IL DG, LLC

Prepared by: Uneclipsed Energy, PLLC

Project Name: Elm Lawn Solar Park

Location: Montgomery County, IL

Parcel ID: 10-34-100-019

Project Size: 2 MWac / 3 MWdc

1. Introduction

This report presents the decommissioning plan for the Elm Lawn Solar Park Solar Facility located in Montgomery County, IL. The purpose of this plan is to describe the procedures and estimated costs associated with removing the solar energy facility and restoring the project site following the end of the facility's useful life. This plan has been developed in compliance with the Standard Solar Agricultural Impact Mitigation Agreement (AIMA), most recently revised by the Illinois Department of Agriculture on August 19, 2019.

2. Project Description

The Elm Lawn Solar Park Solar Facility is a 2 MWac photovoltaic energy project with an installed DC capacity of 3 MWdc. The facility includes photovoltaic modules mounted on single-axis tracking systems together with inverters, transformers, underground electrical collection systems, and associated monitoring and control equipment.

3. Facility Components

The facility components are summarized below, with further detail available in the project application. The procedures for decommissioning these components are described in Section 4 of this Plan.

Solar Photovoltaic (PV) Modules and Racking

Steel single-axis tracking systems will be deployed in this project with driven steel pile foundations, supporting aluminum- or steel-framed PV modules that will produce dc power during daylight hours.

Electrical Balance-Of-System

PV projects require electrical wiring to transmit dc power to inverters that convert dc to ac power. This ~600V ac power is then stepped up through concrete pad-mounted distribution transformers similar to those commonly deployed by electric utilities, to connect to the electrical distribution grid.

Civil Construction

Minimal grading is expected on this site, with final grading and stormwater designs to be incorporated in the civil engineering portion of the Final Construction plans. Two short access driveways will be built off Clark Street to provide access to both project areas, each of which will be fenced. Both fences will be 8' woven wire fence with gates at the driveways.

4. Decommissioning Procedures

The system is expected to be capable of operation for at least thirty-five years, with decommissioning at a time to be agreed upon by the system owner and the landowners leasing the land to the system owner. At the end of the project's life, the system owner shall complete the following list of activities to fully decommission the system. This list is prepared based on current procedures and experience, which will likely improve in the coming years as technology, construction processes and recycling infrastructures improve. Decommissioning activities shall be carried out according to applicable regulations, after obtaining any necessary permits for the decommissioning. The decommissioning activities are as follows, and shall be completed in accordance with OSHA regulations, local/state/federal laws and regulations, and the ever-improving and evolving industry best practices in effect at the time of decommissioning:

- Prepare a safety plan and train all site personnel as to appropriate safeguards and proper work techniques.
- Contact the Utility Company and communicate the cessation of business.
- Disconnect site electric power at the Point of Common Coupling by the site owner or utility. The utility will be responsible for removing all conductors, power poles, and hardware that is under utility ownership.
- Disconnect all dc input source circuit wiring from the combiner boxes.
- Disconnect all dc output circuit wiring from any combiner boxes to inverters.
- Unfasten PV modules from the structural racking system and stack in a staging area (this staging area will be used to store all equipment being removed from the site).
- Remove module home run wiring, raceways, and combiner boxes from the racking system.
- Unbolt the racking system components and stack and remove all driven piers.

- Dig up all buried conductors and backfill trenches. Any excavation shall be performed in a manner to preserve topsoil. Topsoil will be stored near the excavation site in a manner to not become intermixed with subsoil materials.
- Coil and stack wire and conduits. Remove wire connectors and splices, dissemble, and sort as required to maximize recycling value.
- Dismantle inverters, switchgear, and transformers on site when practical, or remove fully intact equipment pads from the site for off-site handling.
- Remove perimeter fencing and pole foundations.
- Sell any recyclable material to a suitable recycling facility, unless the original equipment manufacturer or another organization offers a buy-back program for equipment.
- Dispose of all other materials at appropriate handling facilities in accordance with applicable regulations.
- Dismantle any site roads and restore any compressed soils (under equipment pads, roads) with a subsoiler or flat lifter. Restore any compacted areas to the proper density and depth to remain consistent with the surrounding fields, adding new fill as necessary. Best Efforts shall be performed to place any topsoil in a manner so that after settling occurs, the topsoil's original depth and contour will be restored as close as reasonably practicable.
- Re-seed and re-vegetate disturbed areas of the site, ensuring that the land can return to its original state.

5. Materials Recycling and Disposal

Where feasible, project materials removed during decommissioning will be recycled. This includes steel racking components, recoverable copper or aluminum conductors, and photovoltaic modules where recycling services are available and commercially reasonable.

While the recyclability of steel, copper and aluminum is well-established, solar module recyclers are active in the United States as well, with FabTech Solar Solutions, We Recycle Solar, and ERI (Plainfield, IN) offering collection locations in Illinois or in a neighboring state. In January 2026, the company SOLARCYCLE announced its new recycling facility in Cedartown, GA that expects to hit a capacity of one million solar panels annually by the end of 2026. As most solar panels originally installed in the United States are still in service, it's reasonable to assume an increase in demand for SOLARCYCLE and others in the market.

6. Site Restoration

Following removal of equipment and driveways, disturbed areas will be graded where needed to restore natural surface contours and stabilized with appropriate vegetation or ground cover. The objective of site restoration will be to return the land to a condition compatible with its present use per the AIMA.

7. Agricultural Land Restoration (AIMA Compliance)

Agricultural drainage systems encountered during decommissioning will be repaired if necessary to restore drainage functionality. Soil compaction caused by equipment will be mitigated through subsoiling, deep ripping, or similar agricultural soil restoration techniques, and disturbed areas will be restored to support agricultural use where applicable.

Unless the Landowner opts to do the restoration work on compaction and rutting, after the topsoil has been replaced post-Deconstruction, all areas within the boundaries of the Facility that were traversed by vehicles and Construction and/or Deconstruction equipment that exhibit compaction and rutting shall be restored by the Facility Owner. All prior Cropland shall be ripped at least 18 inches deep or to the extent practicable, and all pasture and woodland shall be ripped at least 12 inches deep or to the extent practicable. The existence of drainage tile lines or underground utilities may necessitate less ripping depth. The disturbed area shall then be disked.

if underground drainage tile lines were present within the footprint of the Facility and were severed or otherwise damaged during original construction, facility operation, and/or facility Deconstruction, the Owner shall repair existing drainage tiles or install new drainage tile lines of comparable quality and cost to the original, within the footprint of the Facility with sufficient capacity to restore the underground drainage capacity that existed within the footprint of the Facility prior to construction. Such installation shall be completed within 12 months after the end of the useful life of the Facility.

During Deconstruction, all additional permanent drainage tile line repairs beyond those included above must be made within 30 days of identification or notification of the damage, weather and soil conditions permitting. At other times, such repairs must be made at a time mutually agreed upon by the Facility Owner and the Landowner. If the Facility Owner and Landowner cannot agree upon a reasonable method to complete this restoration, the Facility Owner may implement the recommendations of the appropriate County Soil & Water Conservation District and such implementation constitutes compliance with this provision.

8. Decommissioning Schedule, Project Useful Life, and Abandonment

This project will be designed to operate for a useful life of 40 years.

The project is considered abandoned if electricity generation has ceased for a period of twelve consecutive months without evidence that the Owner intends to resume operations. Per the AIMA, a Commercial Solar Energy Facility shall be presumed to have reached the end of its useful life if the Facility Owner refuses, for a period of 6 consecutive months, to pay the Landowner amounts owed in accordance with an Underlying Agreement.

Upon abandonment, the Project Owner will initiate the decommissioning process in accordance with this plan. The Owner will, at its expense, complete Deconstruction within 12 months after the end of the useful life of the Facility.

9. Decommissioning Cost Estimate

Estimated costs associated with removal of equipment, site restoration, transportation, recycling, and disposal of project materials are summarized in this report. The estimate also accounts for contractor mobilization, contingency, labor, and other project-related costs.

10. Financial Assurance

Financial Assurance for decommissioning may be provided through mechanisms such as a surety bond, escrow account, letter of credit, or other financial instrument acceptable to the applicable jurisdiction. The amount of financial assurance should be based on the estimated net decommissioning cost presented in this report unless the governing ordinance requires a different basis. It is the intent of the Facility Owner to provide this assurance via surety bond, renewed annually, that would be available to any party to perform the system deconstruction and decommissioning.

The Facility Owner shall provide the County with Financial Assurance to cover the estimated costs of Deconstruction of the Facility. Provision of this Financial Assurance shall be phased in over the first 11 years of the Project's operation as follows:

1. On or before the first anniversary of the Commercial Operation Date, the Facility Owner shall provide the County with Financial Assurance to cover ten (10) percent of the estimated costs of Deconstruction of the Facility as determined in the Deconstruction Plan.
2. On or before the sixth anniversary of the Commercial Operation Date, the Facility Owner shall provide the County with Financial Assurance to cover fifty (50) percent of the estimated costs of Deconstruction of the Facility as determined in the Deconstruction Plan.
3. On or before the eleventh anniversary of the Commercial Operation Date, the Facility Owner shall provide the County with Financial Assurance to cover one hundred (100) percent of the estimated costs of Deconstruction of the Facility as determined in the updated Deconstruction Plan provided during the tenth year of commercial operation.

The Financial Assurance shall not release the surety from liability until the Financial Assurance is replaced. The salvage value of the Facility may only be used to reduce the estimated costs of Deconstruction if the County agrees that all interests in the salvage value are subordinate or have been subordinated to that of the County if Abandonment occurs.

11. Assumptions and Limitations

This estimate represents the engineer's opinion of probable costs based on available information and current market conditions. Actual costs may vary depending on contractor pricing, labor rates, disposal charges, recycling markets, equipment availability, and other factors at the time of decommissioning.

12. Engineer Certification

This report has been prepared by David K. Click, PE using available project information and generally accepted engineering practices for pre-construction photovoltaic facility decommissioning planning. Final project-specific certification language should be reviewed by the responsible Professional Engineer at the appropriate time.

13. Decommissioning Cost Summary

Item	Estimated Cost
Equipment Removal	$74,372
Electrical Removal	$48,417
Site Restoration	$15,000
Mobilization	$13829
Total Estimated Cost	$174,936
Estimated Salvage Value	$29,655
Net Decommissioning Cost	$145,281

E

Appendix E:

Agricultural Impact Mitigation Agreement

Illinois Department of Agriculture

JB Pritzker, Governor
Jerry Costello II, Director

Bureau of Land and Water Resources
State Fairgrounds • P.O. Box 19281 • Springfield, IL 62794-9281 • 217/782-6297 • TDD 866/287-2999 • Fax 217/557-0993

March 9, 2026

Dear Landowner:

As the landowner across which the SDG IL DG LLC is planning to construct a solar farm and related ±2000.00 MW Commercial Solar Energy Facility, that will consist of solar panel arrays, racking systems, access roads, an onsite underground collection system, inverters and transformers, the Illinois Department of Agriculture would like to inform you of the following matter.

Effective March 4, 2026, SDG IL DG LLC and the Illinois Department of Agriculture (IDOA) entered into an Agricultural Impact Mitigation Agreement (AIMA) establishing standards and policies that SDG IL DG LLC will follow as it constructs a ±2000.00 KW commercial Solar Energy Facility over agricultural land in Montgomery County. The enclosed AIMA will provide a high level of protection to such land, but it may not address specific concerns that you may have. Such concerns must be addressed individually in your own easement contract to accomplish your specific goals.

As you review the AIMA, you may identify procedures that you would like to change. Your right to negotiate changes is preserved by Paragraph B. on page one of the AIMA. It states, **"**Except for Section 17B. through F., all actions set forth in this AIMA are subject to modification through negotiation by Landowners and the Facility Owner, provided such changes are negotiated in advance of the respective Construction or Deconstruction activities.**"** It is your decision as to whether you discuss the changes you desire with the right-of-way agent that is assigned to you. Of course, you also have the option to seek your own attorney to make sure your interests are protected.

As you consider your personal interests, you may want to include the owner indemnification clause in your individual easement agreement to protect yourself, your family and future heirs against future claims or expenses arising from the commercial solar energy facility's construction, repairs and maintenance. This item is covered in Section 16 of the AIMA. We feel it is best that such issues are left to landowners to address in their individual easement contracts if specific items are of concern.

Please note that although the IDOA has entered the AIMA with the SDG IL DG LLC it does not constitute our endorsement of the project. The AIMA's sole purpose is to provide a high level of protection to landowners and agricultural land that will be impacted by the construction of the Solar Farm.

If you have questions, feel free to contact me at 217-785-5594, the address listed above, or agr.aima@illinois.gov.

Sincerely,

Jeffrey Evers, Supervisor
Bureau of Land and Water Resources

Enclosure
JE:SM

cc: Jerry Costello II, IDOA Director
Clay Nordsiek, IDOA
Michelle Curby, IDOA
Bill Bodine, Laura Harmon - IL Farm Bureau
Garrett W. Thalgott – IL Farm Bureau
Montgomery Co. Farm Bureau Manager
Montgomery Co. Soil and Water Conservation District (SWCD)
Regional Representatives

STANDARD AGRICULTURAL IMPACT MITIGATION AGREEMENT
between
SDG IL DG LLC

and the
ILLINOIS DEPARTMENT OF AGRICULTURE
Pertaining to the Construction of a Commercial Solar Energy Facility
in
Montgomery County, Illinois

Pursuant to the Renewable Energy Facilities Agricultural Impact Mitigation Act (505 ILCS 147), the following standards and policies are required by the Illinois Department of Agriculture (IDOA) to help preserve the integrity of any Agricultural Land that is impacted by the Construction and Deconstruction of a Commercial Solar Energy Facility. They were developed with the cooperation of agricultural agencies, organizations, Landowners, Tenants, drainage contractors, and solar energy companies to comprise this Agricultural Impact Mitigation Agreement (AIMA).

SDG IL DG LLC, hereafter referred to as Commercial Solar Energy Facility Owner, or simply as Facility Owner, plans to develop and/or operate a 2,000 kW-AC Commercial Solar Energy Facility in Montgomery County [GPS Coordinates: 39.1842805, -89.6346546], which will consist of up to 17 acres that will be covered by solar facility related components, such as solar panel arrays, racking systems, access roads, an onsite underground collection system, inverters and transformers and any affiliated electric transmission lines. This AIMA is made and entered between the Facility Owner and the IDOA.

If Construction does not commence within four years after this AIMA has been fully executed, this AIMA shall be revised, with the Facility Owner's input, to reflect the IDOA's most current Solar Farm Construction and Deconstruction Standards and Policies. This AIMA, and any updated AIMA, shall be filed with the County Board by the Facility Owner prior to the commencement of Construction.

The below prescribed standards and policies are applicable to Construction and Deconstruction activities occurring partially or wholly on privately owned agricultural land.

Conditions of the AIMA

The mitigative actions specified in this AIMA shall be subject to the following conditions:

A. All Construction or Deconstruction activities may be subject to County or other local requirements. However, the specifications outlined in this AIMA shall be the minimum standards applied to all Construction or Deconstruction activities. IDOA may utilize any legal means to enforce this AIMA.

B. Except for Section 17. B. through F., all actions set forth in this AIMA are subject to modification through negotiation by Landowners and the Facility Owner, provided such changes are negotiated in advance of the respective Construction or Deconstruction activities.

C. The Facility Owner may negotiate with Landowners to carry out the actions that Landowners wish to perform themselves. In such instances, the Facility Owner shall offer Landowners the area commercial rate for their machinery and labor costs.

D. All provisions of this AIMA shall apply to associated future Construction, maintenance, repairs, and Deconstruction of the Facility referenced by this AIMA.

E. The Facility Owner shall keep the Landowners and Tenants informed of the Facility's Construction and Deconstruction status, and other factors that may have an impact upon their farming operations.

F. The Facility Owner shall include a statement of its adherence to this AIMA in any environmental assessment and/or environmental impact statement.

G. Execution of this AIMA shall be made a condition of any Conditional/Special Use Permit. Not less than 30 days prior to the commencement of Construction, a copy of this AIMA shall be provided by the Facility Owner to each Landowner that is party to an Underlying Agreement. In addition, this AIMA shall be incorporated into each Underlying Agreement.

H. The Facility Owner shall implement all actions to the extent that they do not conflict with the requirements of any applicable federal, state and local rules and regulations and other permits and approvals that are obtained by the Facility Owner for the Facility.

I. No later than 45 days prior to the Construction and/or Deconstruction of a Facility, the Facility Owner shall provide the Landowner(s) with a telephone number the Landowner can call to alert the Facility Owner should the Landowner(s) have questions or concerns with the work which is being done or has been carried out on his/her property.

J. If there is a change in ownership of the Facility, the Facility Owner assuming ownership of the Facility shall provide written notice within 90 days of ownership transfer, to the Department, the County, and to Landowners of such change. The Financial Assurance requirements and the other terms of this AIMA shall apply to the new Facility Owner.

K. The Facility Owner shall comply with all local, state and federal laws and regulations, specifically including the worker protection standards to protect workers from pesticide exposure.

L. Within 30 days of execution of this AIMA, the Facility Owner shall use Best Efforts to provide the IDOA with a list of all Landowners that are party to an Underlying Agreement and known Tenants of said Landowner who may be affected by the Facility. As the list of Landowners and Tenants is updated, the Facility Owner shall notify the IDOA of any additions or deletions.

M. If any provision of this AIMA is held to be unenforceable, no other provision shall be affected by that holding, and the remainder of the AIMA shall be interpreted as if it did not contain the unenforceable provision.

Definitions

Abandonment	When Deconstruction has not been completed within 12 months after the Commercial Solar Energy Facility reaches the end of its useful life. For purposes of this definition, a Commercial Solar Energy Facility shall be presumed to have reached the end of its useful life if the Commercial Solar Energy Facility Owner fails, for a period of 6 consecutive months, to pay the Landowner amounts owed in accordance with an Underlying Agreement.

Aboveground Cable	Electrical power lines installed above ground surface to be utilized for conveyance of power from the solar panels to the solar facility inverter and/or point of interconnection to utility grid or customer electric meter.
Agricultural Impact Mitigation Agreement (AIMA)	The Agreement between the Facility Owner and the Illinois Department of Agriculture (IDOA) described herein.
Agricultural Land	Land used for Cropland, hayland, pastureland, managed woodlands, truck gardens, farmsteads, commercial ag-related facilities, feedlots, livestock confinement systems, land on which farm buildings are located, and land in government conservation programs used for purposes as set forth above.
Best Efforts	Diligent, good faith, and commercially reasonable efforts to achieve a given objective or obligation.
Commercial Operation Date	The calendar date of which the Facility Owner notifies the Landowner, County, and IDOA in writing that commercial operation of the facility has commenced. If the Facility Owner fails to provide such notifications, the Commercial Operation Date shall be the execution date of this AIMA plus 6 months.
Commercial Solar Energy Facility (Facility)	A solar energy conversion facility equal to or greater than 500 kilowatts in total nameplate capacity, including a solar energy conversion facility seeking an extension of a permit to construct granted by a county or municipality before June 29, 2018. "Commercial solar energy facility" does not include a solar energy conversion facility: (1) for which a permit to construct has been issued before June 29, 2018; (2) that is located on land owned by the commercial solar energy facility owner; (3) that was constructed before June 29, 2018; or (4) that is located on the customer side of the customer's electric meter and is primarily used to offset that customer's electricity load and is limited in nameplate capacity to less than or equal to 2,000 kilowatts.
Commercial Solar Energy Facility Owner deemed (Facility Owner)	A person or entity that owns a commercial solar energy facility. A Commercial Solar Energy Facility Owner is not nor shall it be to be a public utility as defined in the Public Utilities Act.
County	The County or Counties where the Commercial Solar Energy Facility is located.
Construction	The installation, preparation for installation and/or repair of a Facility.
Cropland	Land used for growing row crops, small grains or hay; includes land which was formerly used as cropland, but is currently enrolled in a government conservation program; also includes pastureland that is classified as Prime Farmland.

Deconstruction	The removal of a Facility from the property of a Landowner and the restoration of that property as provided in the AIMA.
Deconstruction Plan	A plan prepared by a Professional Engineer, at the Facility's expense, that includes: (1) the estimated Deconstruction cost, in current dollars at the time of filing, for the Facility, considering among other things: i. the number of solar panels, racking, and related facilities involved; ii. the original Construction costs of the Facility; iii. the size and capacity, in megawatts of the Facility; iv. the salvage value of the facilities (if all interests in salvage value are subordinate to that of the Financial Assurance holder if abandonment occurs); v. the Construction method and techniques for the Facility and for other similar facilities; and (2) a comprehensive detailed description of how the Facility Owner plans to pay for the Deconstruction of the Facility.
Department	The Illinois Department of Agriculture (IDOA).
Financial Assurance	A reclamation or surety bond or other commercially available financial assurance that is acceptable to the County, with the County or Landowner as beneficiary.
Landowner	Any person with an ownership interest in property that is used for agricultural purposes and that is party to an Underlying Agreement.
Prime Farmland	Agricultural Land comprised of soils that are defined by the USDA Natural Resources Conservation Service (NRCS) as "Prime Farmland" (generally considered to be the most productive soils with the least input of nutrients and management).
Professional Engineer	An engineer licensed to practice engineering in the State of Illinois.
Soil and Water Conservation District (SWCD)	A unit of local government that provides technical and financial assistance to eligible Landowners for the conservation of soil and water resources.
Tenant	Any person, apart from the Facility Owner, lawfully residing or leasing/renting land that is subject to an Underlying Agreement.
Topsoil	The uppermost layer of the soil that has the darkest color or the highest content of organic matter; more specifically, it is defined as the "A" horizon.
Underlying Agreement	The written agreement between the Facility Owner and the Landowner(s) including, but not limited to, an easement, option, lease, or license under the terms of which another person has constructed, constructs, or intends to construct a Facility on the property of the Landowner.

Underground Cable	Electrical power lines installed below the ground surface to be utilized for conveyance of power within a Facility or from a Commercial Solar Energy Facility to the electric grid.
USDA Natural Resources Conservation Service (NRCS)	An agency of the United States Department of Agriculture that provides America's farmers with financial and technical assistance to aid with natural resources conservation.

Construction and Deconstruction Standards and Policies

1. Support Structures

A. Only single pole support structures shall be used for the Construction and operation of the Facility on Agricultural Land. Other types of support structures, such as lattice towers or H-frames, may be used on nonagricultural land.

B. Where a Facility's Aboveground Cable will be adjacent and parallel to highway and/or railroad right-of-way, but on privately owned property, the support structures shall be placed as close as reasonably practicable and allowable by the applicable County Engineer or other applicable authorities to the highway or railroad right-of-way. The only exceptions may be at jogs or weaves on the highway alignment or along highways or railroads where transmission and distribution lines are already present.

C. When it is not possible to locate Aboveground Cable next to highway or railroad right-of-way, Best Efforts shall be expended to place all support poles in such a manner to minimize their placement on Cropland (i.e., longer than normal above ground spans shall be utilized when traversing Cropland).

2. Aboveground Facilities

Locations for facilities shall be selected in a manner that is as unobtrusive as reasonably possible to ongoing agricultural activities occurring on the land that contains or is adjacent to the Facility.

3. Guy Wires and Anchors

Best Efforts shall be made to place guy wires and their anchors, if used, out of Cropland, pastureland and hayland, placing them instead along existing utilization lines and on land other than Cropland. Where this is not feasible, Best Efforts shall be made to minimize guy wire impact on Cropland. All guy wires shall be shielded with highly visible guards.

4. Underground Cabling Depth

A. Underground electrical cables located outside the perimeter of the (fence) of the solar panels shall be buried with:

1. a minimum of 5 feet of top cover where they cross Cropland.
2. a minimum of 5 feet of top cover where they cross pastureland or other non-Cropland classified as Prime Farmland.
3. a minimum of 3 feet of top cover where they cross pastureland and other Agricultural Land not classified as Prime Farmland.

4. a minimum of 3 feet of top cover where they cross wooded/brushy land.

B. Provided that the Facility Owner removes the cables during Deconstruction, underground electric cables may be installed to a minimum depth of 18 inches:

1. Within the fenced perimeter of the Facility; or

2. When buried under an access road associated with the Facility provided that the location and depth of cabling is clearly marked at the surface.

C. If Underground Cables within the fenced perimeter of the solar panels are installed to a minimum depth of 5 feet, they may remain in place after Deconstruction.

5. Topsoil Removal and Replacement

A. Any excavation shall be performed in a manner to preserve topsoil. Best Efforts shall be made to store the topsoil near the excavation site in such a manner that it will not become intermixed with subsoil materials.

B. Best Efforts shall be made to store all disturbed subsoil material near the excavation site and separate from the topsoil.

C. When backfilling an excavation site, Best Efforts shall be used to ensure the stockpiled subsoil material will be placed back into the excavation site before replacing the topsoil.

D. Refer to Section 7 for procedures pertaining to rock removal from the subsoil and topsoil.

E. Refer to Section 8 for procedures pertaining to the repair of compaction and rutting of the topsoil.

F. Best Efforts shall be performed to place the topsoil in a manner so that after settling occurs, the topsoil's original depth and contour will be restored as close as reasonably practicable. The same shall apply where excavations are made for road, stream, drainage ditch, or other crossings. In no instance shall the topsoil materials be used for any other purpose unless agreed to explicitly and in writing by the Landowner.

G. Based on the mutual agreement of the landowner and Facility Owner, excess soil material resulting from solar facility excavation shall either be removed or stored on the Landowner's property and reseeded per the applicable National Pollution Discharge Elimination System (NPDES) permit/Stormwater Pollution Prevention Plan (SWPPP). After the Facility reaches the end of its Useful Life, the excess subsoil material shall be returned to an excavation site or removed from the Landowner's property, unless otherwise agreed to by Landowner.

6. Rerouting and Permanent Repair of Agricultural Drainage Tiles

The following standards and policies shall apply to underground drainage tile line(s) directly or indirectly affected by Construction and/or Deconstruction:

A. Prior to Construction, the Facility Owner shall work with the Landowner to identify drainage tile lines traversing the property subject to the Underlying Agreement to the extent reasonably practicable. All drainage tile lines identified in this manner shall be shown on the Construction and Deconstruction Plans.

B. The location of all drainage tile lines located adjacent to or within the footprint of the Facility shall be recorded using Global Positioning Systems (GPS) technology. Within 60 days after Construction is complete, the Facility Owner shall provide the Landowner, the IDOA, and the respective County Soil and Water Conservation District (SWCD) with "as built" drawings (strip maps) showing the location of all drainage tile lines by survey station encountered in the Construction of the Facility, including any tile line repair location(s), and any underground cable installed as part of the Facility.

C. **Maintaining Surrounding Area Subsurface Drainage**

If drainage tile lines are damaged by the Facility, the Facility Owner shall repair the lines or install new drainage tile line(s) of comparable quality and cost to the original(s), and of sufficient size and appropriate slope in locations that limit direct impact from the Facility. If the damaged tile lines cause an unreasonable disruption to the drainage system, as determined by the Landowner, then such repairs shall be made promptly to ensure appropriate drainage. Any new line(s) may be located outside of, but adjacent to the perimeter of the Facility. Disrupted adjacent drainage tile lines shall be attached thereto to provide an adequate outlet for the disrupted adjacent tile lines.

D. **Re-establishing Subsurface Drainage Within Facility Footprint**

Following Deconstruction and using Best Efforts, if underground drainage tile lines were present within the footprint of the facility and were severed or otherwise damaged during original Construction, facility operation, and/or facility Deconstruction, the Facility Owner shall repair existing drainage tiles or install new drainage tile lines of comparable quality and cost to the original, within the footprint of the Facility with sufficient capacity to restore the underground drainage capacity that existed within the footprint of the Facility prior to Construction. Such installation shall be completed within 12 months after the end of the useful life of the Facility and shall be compliant with Figures 1 and 2 to this Agreement or based on prudent industry standards if agreed to by Landowner.

E. If there is any dispute between the Landowner and the Facility Owner on the method of permanent drainage tile line repair, the appropriate County SWCD's opinion shall be considered by the Facility Owner and the Landowner.

F. During Deconstruction, all additional permanent drainage tile line repairs beyond those included above in Section 6.D. must be made within 30 days of identification or notification of the damage, weather and soil conditions permitting. At other times, such repairs must be made at a time mutually agreed upon by the Facility Owner and the Landowner. If the Facility Owner and Landowner cannot agree upon a reasonable method to complete this restoration, the Facility Owner may implement the recommendations of the appropriate County SWCD and such implementation constitutes compliance with this provision.

G. Following completion of the work required pursuant to this Section, the Facility Owner shall be responsible for correcting all drainage tile line repairs that fail due to Construction and/or Deconstruction for one year following the completion of Construction or Deconstruction, provided those repairs were made by the Facility Owner. The Facility Owner shall not be responsible for drainage tile repairs that the Facility Owner pays the Landowner to perform.

7. Rock Removal

With any excavations, the following rock removal procedures pertain only to rocks found in the uppermost 42 inches of soil, the common freeze zone in Illinois, which emerged or were brought to the site as a result of Construction and/or Deconstruction.

A. Before replacing any topsoil, Best Efforts shall be taken to remove all rocks greater than 3 inches in any dimension from the surface of exposed subsoil which emerged or were brought to the site as a result of Construction and/or Deconstruction.

B. If trenching, blasting, or boring operations are required through rocky terrain, precautions shall be taken to minimize the potential for oversized rocks to become interspersed in adjacent soil material.

C. Rocks and soil containing rocks removed from the subsoil areas, topsoil, or from any excavations, shall be removed from the Landowner's premises or disposed of on the Landowner's premises at a location that is mutually acceptable to the Landowner and the Facility Owner.

8. Repair of Compaction and Rutting

A. Unless the Landowner opts to do the restoration work on compaction and rutting, after the topsoil has been replaced post-Deconstruction, all areas within the boundaries of the Facility that were traversed by vehicles and Construction and/or Deconstruction equipment that exhibit compaction and rutting shall be restored by the Facility Owner. All prior Cropland shall be ripped at least 18 inches deep or to the extent practicable, and all pasture and woodland shall be ripped at least 12 inches deep or to the extent practicable. The existence of drainage tile lines or underground utilities may necessitate less ripping depth. The disturbed area shall then be disked.

B. All ripping and disking shall be done at a time when the soil is dry enough for normal tillage operations to occur on Cropland adjacent to the Facility.

C. The Facility Owner shall restore all rutted land to a condition as close as possible to its original condition upon Deconstruction, unless necessary earlier as determined by the Landowner.

D. If there is any dispute between the Landowner and the Facility Owner as to what areas need to be ripped/disked or the depth at which compacted areas should be ripped/disked, the appropriate County SWCD's opinion shall be considered by the Facility Owner and the Landowner.

9. Construction During Wet Weather

Except as provided below, construction activities are not allowed on agricultural land during times when normal farming operations, such as plowing, disking, planting or harvesting, cannot take place due to excessively wet soils. With input from the landowner, wet weather conditions may be determined on a field by field basis.

A. Construction activities on prepared surfaces, surfaces where topsoil and subsoil have been removed, heavily compacted in preparation, or otherwise stabilized (e.g. through cement mixing) may occur at the discretion of the Facility Owner in wet weather conditions.

B. Construction activities on unprepared surfaces will be done only when work will not result in rutting which may mix subsoil and topsoil. Determination as to the potential of subsoil and topsoil mixing will be made in consultation with the underlying Landowner, or, if approved by the Landowner, his/her designated tenant or designee.

10. Prevention of Soil Erosion

A. The Facility Owner shall work with Landowners and create and follow a SWPPP to prevent excessive erosion on land that has been disturbed by Construction or Deconstruction of a Facility.

B. If the Landowner and Facility Owner cannot agree upon a reasonable method to control erosion on the Landowner's property, the Facility Owner shall consider the recommendations of the appropriate County SWCD to resolve the disagreement.

C. The Facility Owner may, per the requirements of the project SWPPP and in consultation with the Landowner, seed appropriate vegetation around all panels and other facility components to prevent erosion. The Facility Owner must utilize Best Efforts to ensure that all seed mixes will be as free of any noxious weed seeds as possible. The Facility Owner shall consult with the Landowner regarding appropriate varieties to seed.

11. Repair of Damaged Soil Conservation Practices

Consultation with the appropriate County SWCD by the Facility Owner shall be carried out to determine if there are soil conservation practices (such as terraces, grassed waterways, etc.) that will be damaged by the Construction and/or Deconstruction of the Facility. Those conservation practices shall be restored to their preconstruction condition as close as reasonably practicable following Deconstruction in accordance with USDA NRCS technical standards. All repair costs shall be the responsibility of the Facility Owner.

12. Compensation for Damages to Private Property

The Facility Owner shall reasonably compensate Landowners for damages caused by the Facility Owner. Damage to Agricultural Land shall be reimbursed to the Landowner as prescribed in the applicable Underlying Agreement.

13. Clearing of Trees and Brush

A. If trees are to be removed for the Construction or Deconstruction of a Facility, the Facility Owner shall consult with the Landowner to determine if there are trees of commercial or other value to the Landowner.

B. If there are trees of commercial or other value to the Landowner, the Facility Owner shall allow the Landowner the right to retain ownership of the trees to be removed and the disposition of the removed trees shall be negotiated prior to the commencement of land clearing.

14. Access Roads

A. To the extent practicable, access roads shall be designed to not impede surface drainage and shall be built to minimize soil erosion on or near the access roads.

B. Access roads may be left intact during Construction, operation or Deconstruction through mutual agreement of the Landowner and the Facility Owner unless otherwise restricted by federal, state, or local regulations.

C. If the access roads are removed, Best Efforts shall be expended to assure that the land shall be restored to equivalent condition(s) as existed prior to their construction, or as otherwise agreed to by the Facility Owner and the Landowner. All access roads that are removed shall be ripped to a depth of 18 inches. All ripping shall be performed consistent with Section 8.

15. Weed/Vegetation Control

A. The Facility Owner shall provide for weed control in a manner that prevents the spread of weeds. Chemical control, if used, shall be done by an appropriately licensed pesticide applicator.

B. The Facility Owner shall be responsible for the reimbursement of all reasonable costs incurred by owners of agricultural land where it has been determined by the appropriate state or county entity that weeds have spread from the Facility to their property. Reimbursement is contingent upon written notice to the Facility Owner. Facility Owner shall reimburse the property owner within 45 days after notice is received.

C. The Facility Owner shall ensure that all vegetation growing within the perimeter of the Facility is properly and appropriately maintained. Maintenance may include, but not be limited to, mowing, trimming, chemical control, or the use of livestock as agreed to by the Landowner.

D. The Deconstruction plans must include provisions for the removal of all weed control equipment used in the Facility, including weed-control fabrics or other ground covers.

16. Indemnification of Landowners

The Facility Owner shall indemnify all Landowners, their heirs, successors, legal representatives, and assigns from and against all claims, injuries, suits, damages, costs, losses, and reasonable expenses resulting from or arising out of the Commercial Solar Energy Facility, including Construction and Deconstruction thereof, and also including damage to such Facility or any of its appurtenances, except where claims, injuries, suits, damages, costs, losses, and expenses are caused by the negligence or intentional acts, or willful omissions of such Landowners, and/or the Landowners heirs, successors, legal representatives, and assigns.

17. Deconstruction Plans and Financial Assurance of Commercial Solar Energy Facilities

A. Deconstruction of a Facility shall include the removal/disposition of all solar related equipment/facilities, including the following utilized for operation of the Facility and located on Landowner property:

1. Solar panels, cells and modules;
2. Solar panel mounts and racking, including any helical piles, ground screws, ballasts, or other anchoring systems;
3. Solar panel foundations, if used (to depth of 5 feet);

4. Transformers, inverters, energy storage facilities, or substations, including all components and foundations; however, Underground Cables at a depth of 5 feet or greater may be left in place;
5. Overhead collection system components;
6. Operations/maintenance buildings, spare parts buildings and substation/switching gear buildings unless otherwise agreed to by the Landowner;
7. Access Road(s) unless Landowner requests in writing that the access road is to remain;
8. Operation/maintenance yard/staging area unless otherwise agreed to by the Landowner; and
9. Debris and litter generated by Deconstruction and Deconstruction crews.

B. The Facility Owner shall, at its expense, complete Deconstruction of a Facility within twelve (12) months after the end of the useful life of the Facility.

C. During the County permit process, or if none, then prior to the commencement of construction, the Facility Owner shall file with the County a Deconstruction Plan. The Facility Owner shall file an updated Deconstruction Plan with the County on or before the end of the tenth year of commercial operation.

D. The Facility Owner shall provide the County with Financial Assurance to cover the estimated costs of Deconstruction of the Facility. Provision of this Financial Assurance shall be phased in over the first 11 years of the Project's operation as follows:

1. On or before the first anniversary of the Commercial Operation Date, the Facility Owner shall provide the County with Financial Assurance to cover ten (10) percent of the estimated costs of Deconstruction of the Facility as determined in the Deconstruction Plan.
2. On or before the sixth anniversary of the Commercial Operation Date, the Facility Owner shall provide the County with Financial Assurance to cover fifty (50) percent of the estimated costs of Deconstruction of the Facility as determined in the Deconstruction Plan.
3. On or before the eleventh anniversary of the Commercial Operation Date, the Facility Owner shall provide the County with Financial Assurance to cover one hundred (100) percent of the estimated costs of Deconstruction of the Facility as determined in the updated Deconstruction Plan provided during the tenth year of commercial operation.

The Financial Assurance shall not release the surety from liability until the Financial Assurance is replaced. The salvage value of the Facility may only be used to reduce the estimated costs of Deconstruction if the County agrees that all interests in the salvage value are subordinate or have been subordinated to that of the County if Abandonment occurs.

E. The County may, but is not required to, reevaluate the estimated costs of Deconstruction of any Facility after the tenth anniversary, and every five years thereafter, of the Commercial Operation Date. Based on any reevaluation, the County may require changes in the level of Financial Assurance used to calculate the phased Financial Assurance levels described in Section 17.D. required from the Facility Owner. If the County is unable to its satisfaction to perform the investigations necessary to approve the Deconstruction Plan filed by the Facility Owner, then the County and Facility may mutually agree on the selection of a Professional Engineer independent of the Facility Owner to conduct any necessary investigations. The Facility Owner shall be responsible for the cost of any such investigations.

F. Upon Abandonment, the County may take all appropriate actions for Deconstruction including drawing upon the Financial Assurance.

Concurrence of the Parties to this AIMA

The Illinois Department of Agriculture and SDG IL DG LLC concur that this AIMA is the complete AIMA governing the mitigation of agricultural impacts that may result from the Construction and Deconstruction of the solar farm project in Montgomery County within the State of Illinois.

The effective date of this AIMA commences on the date of execution.

STATE OF ILLINOIS
DEPARTMENT OF AGRICULTURE

Jerry Costello II 4

By: Jerry Costello II, Director

Clay Nordsiek

By Clay Nordsiek, Deputy General Counsel

801 E. Sangamon Avenue,
State Fairgrounds, POB 19281
Springfield, IL 62794-9281

3/4, 2026

SDG IL DG LLC

box SIGN 4KYY9JX4-18QK7RPP

By Justin Vandenbroeck - COO

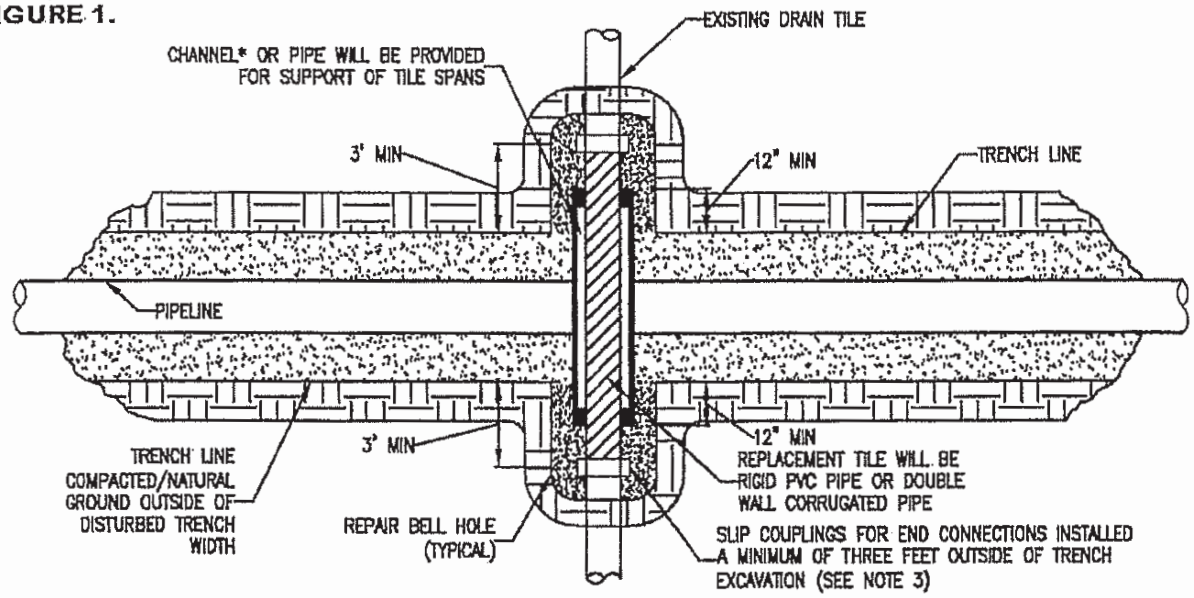
2250 Lucien Way ste. 305, Maitland, FL 32751

Address

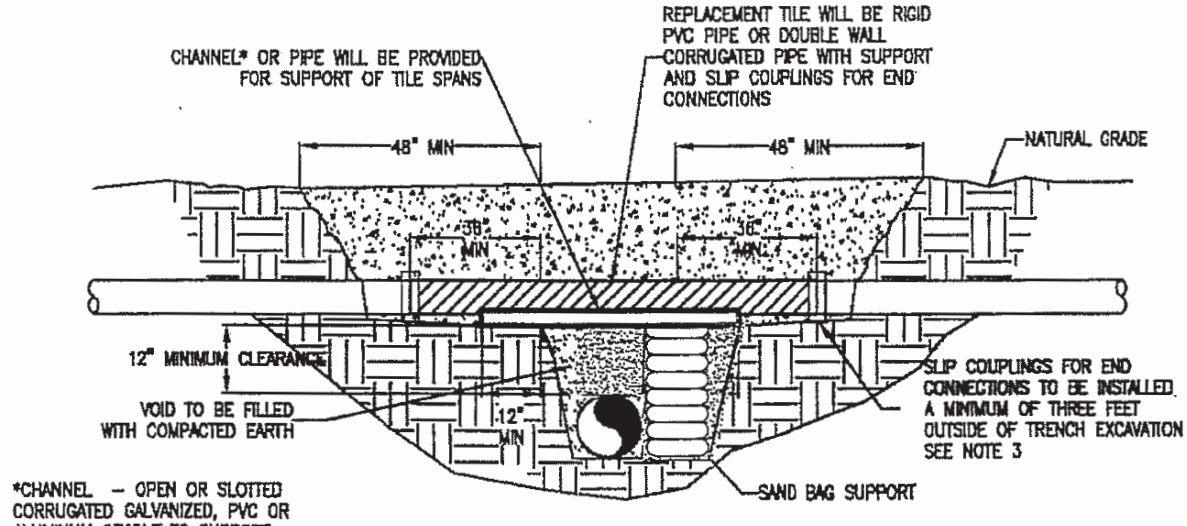
February 16th, 2026

Standard Solar AIMA V.8.19.19

FIGURE 1.



PLAN
N.T.S.



CROSS SECTION
N.T.S.

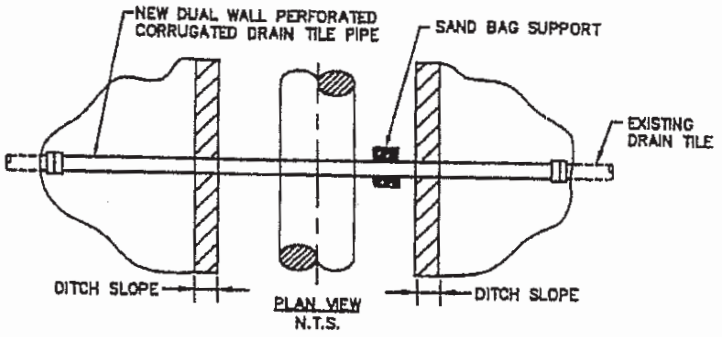
NOTE:

1. IMMEDIATELY REPAIR TILE IF WATER IS FLOWING THROUGH TILE AT TIME OF TRENCHING. IF NO WATER IS FLOWING AND TEMPORARY REPAIR IS DELAYED, OR NOT MADE BY THE END OF THE WORK DAY, A SCREEN OR APPROPRIATE 'NIGHT CAP' SHALL BE PLACED ON OPEN ENDS OF TILE TO PREVENT ENTRAPMENT OF ANIMALS ETC.
2. CHANNEL OR PIPE (OPEN OR SLOTTED) MADE OF CORRUGATED GALVANIZED PIPE, PVC OR ALUMINUM WILL BE USED FOR SUPPORT OF DRAIN TILE SPANS.
3. INDUSTRY STANDARDS SHALL BE FOLLOWED TO ENSURE PROPER SEAL OF REPAIRED DRAIN TILES.

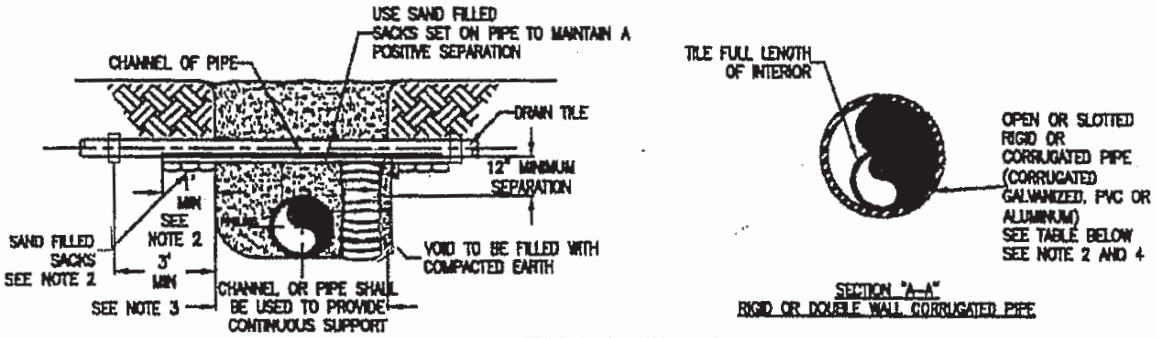
TEMPORARY DRAIN TILE REPAIR

PAGE 1 of 2

FIGURE 2.



PLAN VIEW



END VIEWS

MINIMUM SUPPORT TABLE			
TILE SIZE	CHANNEL SIZE	PIPE SIZE	
3"	4" @ 5.4 #/ft	4"	STD. WT.
4"-5"	5" @ 6.7 #/ft	6"	STD. WT.
6"-9"	7" @ 9.8 #/ft	9"-10"	STD. WT.
10"	10" @ 15.3 #/ft	12"	STD. WT.

NOTE:

1. TILE REPAIR AND REPLACEMENT SHALL MAINTAIN ORIGINAL ALIGNMENT GRADIENT AND WATER FLOW TO THE GREATEST EXTENT POSSIBLE. IF THE TILE NEEDS TO BE RELOCATED, THE INSTALLATION ANGLE MAY VARY DUE TO SITE SPECIFIC CONDITIONS AND LANDOWNER RECOMMENDATIONS.
2. 1'-0" MINIMUM LENGTH OF CHANNEL OR RIGID PIPE (OPEN OR SLOTTED CORRUGATED GALVANIZED, PVC OR ALUMINUM CRADLE) SHALL BE SUPPORTED BY UNDISTURBED SOIL, OR IF CROSSING IS NOT AT RIGHT ANGLES TO PIPELINE, EQUIVALENT LENGTH PERPENDICULAR TO TRENCH. SHIM WITH SAND BAGS TO UNDISTURBED SOIL FOR SUPPORT AND DRAINAGE GRADIENT MAINTENANCE (TYPICAL BOTH SIDES).
3. DRAIN TILES WILL BE PERMANENTLY CONNECTED TO EXISTING DRAIN TILES A MINIMUM OF THREE FEET OUTSIDE OF EXCAVATED TRENCH LINE USING INDUSTRY STANDARDS TO ENSURE PROPER SEAL OF REPAIRED DRAIN TILES INCLUDING SLIP COUPLINGS.
4. DIAMETER OF RIGID PIPE SHALL BE OF ADEQUATE SIZE TO ALLOW FOR THE INSTALLATION OF THE TILE FOR THE FULL LENGTH OF THE RIGID PIPE.
5. OTHER METHODS OF SUPPORTING DRAIN TILE MAY BE USED IF ALTERNATE PROPOSED IS EQUIVALENT IN STRENGTH TO THE CHANNEL/PIPE SECTIONS SHOWN AND IF APPROVED BY COMPANY REPRESENTATIVES AND LANDOWNER IN ADVANCE. SITE SPECIFIC ALTERNATE SUPPORT SYSTEM TO BE DEVELOPED BY COMPANY REPRESENTATIVES AND FURNISHED TO CONTRACTOR FOR SPANS IN EXCESS OF 20', TILE GREATER THEN 10" DIAMETER, AND FOR "HEADER" SYSTEMS.
6. ALL MATERIAL TO BE FURNISHED BY CONTRACTOR.
7. PRIOR TO REPAIRING TILE, CONTRACTOR SHALL PROBE LATERALLY INTO THE EXISTING TILE TO FULL WIDTH OF THE RIGHTS OF WAY TO DETERMINE IF ADDITIONAL DAMAGE HAS OCCURRED. ALL DAMAGED/DISTURBED TILE SHALL BE REPAIRED AS NEAR AS PRACTICABLE TO ITS ORIGINAL OR BETTER CONDITION.

PERMANENT DRAIN TILE REPAIR

PAGE 2 of 2

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F

Appendix F:

EcoCAT Consultation

EcoCAT
Ecological Compliance Assessment Tool

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Applicant: SDG IL DG, LLC
Contact: Luis Gonzalez
Address: 2250 Lucien Way
Suite 305
Maitland, FL 32751

IDNR Project Number: 2610455
Date: 02/03/2026

Project: Elm Lawn Solar Park
Address: E Clark St, Litchfield

Description: The proposed project is a 11-acre solar park located northeast of Litchfield. The project would produce 2 Megawatts (AC) of renewable energy supporting the local community.
Parcel ID: 10-34-100-019
Property Address: E CLARK ST
Township: NORTH LITCHFIELD
Brief Legal Description: PT SE1/4 NW1/4 S34 T9 R5

Natural Resource Review Results

Consultation for Endangered Species Protection and Natural Areas Preservation (Part 1075)

The Illinois Natural Heritage Database contains no record of State-listed threatened or endangered species, Illinois Natural Area Inventory sites, dedicated Illinois Nature Preserves, or registered Land and Water Reserves in the vicinity of the project location.

Consultation is terminated. This consultation is valid for two years unless new information becomes available that was not previously considered; the proposed action is modified; or additional species, essential habitat, or Natural Areas are identified in the vicinity. If the project has not been implemented within two years of the date of this letter, or any of the above listed conditions develop, a new consultation is necessary. Termination does not imply IDNR's authorization or endorsement.

Location

The applicant is responsible for the accuracy of the location submitted for the project.

County: Montgomery

Township, Range, Section:
9N, 5W, 34

IL Department of Natural Resources Contact
Adam Rawe
217-785-5500
Division of Ecosystems & Environment

Government Jurisdiction
Montgomery County
Mike Plunkett
#1 Courthouse Square
Room 202
Hilsboro, Illinois 62049

Disclaimer

The Illinois Natural Heritage Database cannot provide a conclusive statement on the presence, absence, or condition of natural resources in Illinois. This review reflects the information existing in the Database at the time of this inquiry, and should not be regarded as a final statement on the site being considered, nor should it be a substitute for detailed site surveys or field surveys required for environmental assessments. If additional protected resources are encountered during the project's implementation, compliance with applicable statutes and regulations is required.

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EcoCAT
Ecological Compliance Assessment Tool

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

EcoCAT Receipt

Project Code 2610455

APPLICANT	DATE
SDG IL DG, LLC Luis Gonzalez 2250 Lucien Way Suite 305 Maitland, FL 32751	2/3/2026

DESCRIPTION	FEE	CONVENIENCE FEE	TOTAL PAID
EcoCAT Consultation	$ 125.00	$ 2.81	$ 127.81

TOTAL PAID $ 127.81

Illinois Department of Natural Resources
One Natural Resources Way
Springfield, IL 62702
217-785-5500
dnr.ecocat@illinois.gov

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Appendix G:
IPaC Consultation

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Montgomery County, Illinois

Local office

Southern Illinois Sub-Office

(618) 998-5945
Marion@fws.gov

MAILING ADDRESS
Southern Illinois Sub-office
8588 Route 148
Marion, IL 62959-5822

PHYSICAL ADDRESS
6987 Headquarters Road
Marion, IL 62959

https://www.fws.gov/office/illinois-iowa-ecological-services

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Indiana Bat Myotis sodalis Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/5949	Endangered
Tricolored Bat Perimyotis subflavus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Birds

NAME	STATUS
Whooping Crane Grus americana No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/758	EXPN

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/9743	Proposed Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act [2] and the Migratory Bird Treaty Act (MBTA) [1]. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are Bald Eagles and/or Golden Eagles in your project area.

Measures for Proactively Minimizing Eagle Impacts
For information on how to best avoid and minimize disturbance to nesting bald eagles, please review the National Bald Eagle Management Guidelines. You may employ the timing and activity-specific distance recommendations in this document when designing your project/activity to avoid and minimize eagle impacts. For bald eagle information specific to Alaska, please refer to Bald Eagle Nesting and Sensitivity to Human Activity.

The FWS does not currently have guidelines for avoiding and minimizing disturbance to nesting Golden Eagles. For site-specific recommendations regarding nesting Golden Eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

If disturbance or take of eagles cannot be avoided, an incidental take permit may be available to authorize any take that results from, but is not the purpose of, an otherwise lawful activity. For assistance making this determination for Bald Eagles, visit the Do I Need A Permit Tool. For assistance making this determination for golden eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

Ensure Your Eagle List is Accurate and Complete
If your project area is in a poorly surveyed area in IPaC, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to bald or golden eagles on your list, see the "Probability of Presence Summary" below to see when these bald or golden eagles are most likely to be present and breeding in your project area.

Review the FAQs
The FAQs below provide important additional information and resources.

NAME	BREEDING SEASON
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (▪)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

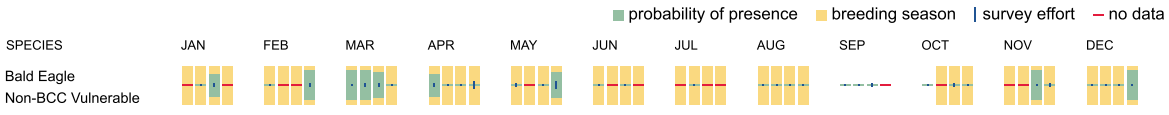
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Bald & Golden Eagles FAQs

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are an eagle (Bald and Golden Eagle Protection Act requirements may apply).

Proper interpretation and use of your eagle report
On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort line or no data line (red horizontal) means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds have the potential to be in your project area, when they might be there,

and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide you in knowing when to implement avoidance and minimization measures to eliminate or reduce potential impacts from your project activities or get the appropriate permits should presence be confirmed.

How do I know if eagles are breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the RAIL Tool and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If an eagle on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your "IPaC PROBABILITY OF PRESENCE SUMMARY" at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

Interpreting the Probability of Presence Graphs

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:
The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Migratory birds

The Migratory Bird Treaty Act (MBTA) [1] prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service).

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

Measures for Proactively Minimizing Migratory Bird Impacts

Your IPaC Migratory Bird list showcases birds of concern, including Birds of Conservation Concern (BCC), in your project location. This is not a comprehensive list of all birds found in your project area. However, you can help proactively minimize significant impacts to all birds at your project location by implementing the measures in the Nationwide avoidance and minimization measures for birds document, and any other project-specific avoidance and minimization measures suggested at the link Measures for avoiding and minimizing impacts to birds for the birds of concern on your list below.

Ensure Your Migratory Bird List is Accurate and Complete

If your project area is in a poorly surveyed area, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles document, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

Review the FAQs
The FAQs below provide important additional information and resources.

NAME	BREEDING SEASON
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Chimney Swift Chaetura pelagica This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Eastern Whip-poor-will Antrostomus vociferus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Red-headed Woodpecker Melanerpes erythrocephalus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Rusty Blackbird Euphagus carolinus This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Wood Thrush Hylocichla mustelina This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

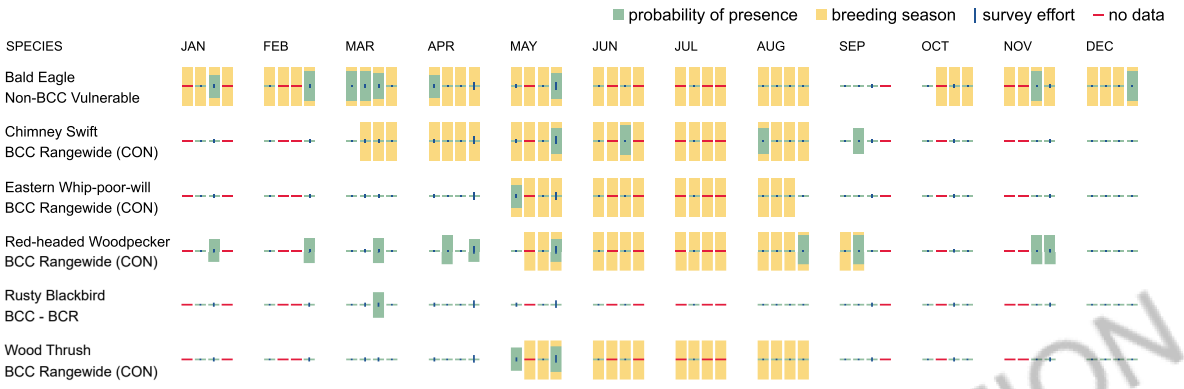
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Migratory Bird FAQs

Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Avoidance & Minimization Measures for Birds describes measures that can help avoid and minimize impacts to all birds at any location year-round. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is one of the most effective ways to minimize impacts. To see when birds are most likely to occur and breed in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location, such as those listed under the Endangered Species Act or the Bald and Golden Eagle Protection Act and those species marked as "Vulnerable". See the FAQ "What are the levels of concern for migratory birds?" for more information on the levels of concern covered in the IPaC migratory bird species list.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) with which your project intersects. These species have been identified as warranting special attention because they are BCC species in that area, an eagle (Bald and Golden Eagle Protection Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, and to verify survey effort when no results present, please visit the Rapid Avian Information Locator (RAIL) Tool.

Why are subspecies showing up on my list?

Subspecies profiles are included on the list of species present in your project area because observations in the AKN for **the species** are being detected. If the species are present, that means that the subspecies may also be present. If a subspecies shows up on your list, you may need to rely on other resources to determine if that subspecies may be present (e.g. your local FWS field office, state surveys, your own surveys).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the RAIL Tool and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your "IPaC PROBABILITY OF PRESENCE SUMMARY" at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Bald and Golden Eagle Protection Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially BCC species. For more information on avoidance and minimization measures you can implement to help avoid and minimize migratory bird impacts, please see the FAQ “Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds”.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Proper interpretation and use of your migratory bird report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list does not represent all birds present in your project area. It is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide implementation of avoidance and minimization measures to eliminate or reduce potential impacts from your project activities, should presence be confirmed. To learn more about avoidance and minimization measures, visit the FAQ "Tell me about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

Interpreting the Probability of Presence Graphs
Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:
The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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H

Appendix H:

FAA Pre-screening Results

OE/AAA Pre-screening Results

Tue Mar 17 2026 09:06:39 GMT-0400 (Eastern Daylight Time)

Structure: Solar Panel

Latitude	Longitude	Height	Site Elevation	AMSL
39 11 06.52 N	89 38 10.23 W	15	690	705
39 10 57.36 N	89 38 10.62 W	15	687	702
39 10 57.30 N	89 38 04.55 W	15	688	703
39 11 06.58 N	89 38 01.91 W	15	685	700

Based on the information you provided, you are not required to file notice with the FAA.

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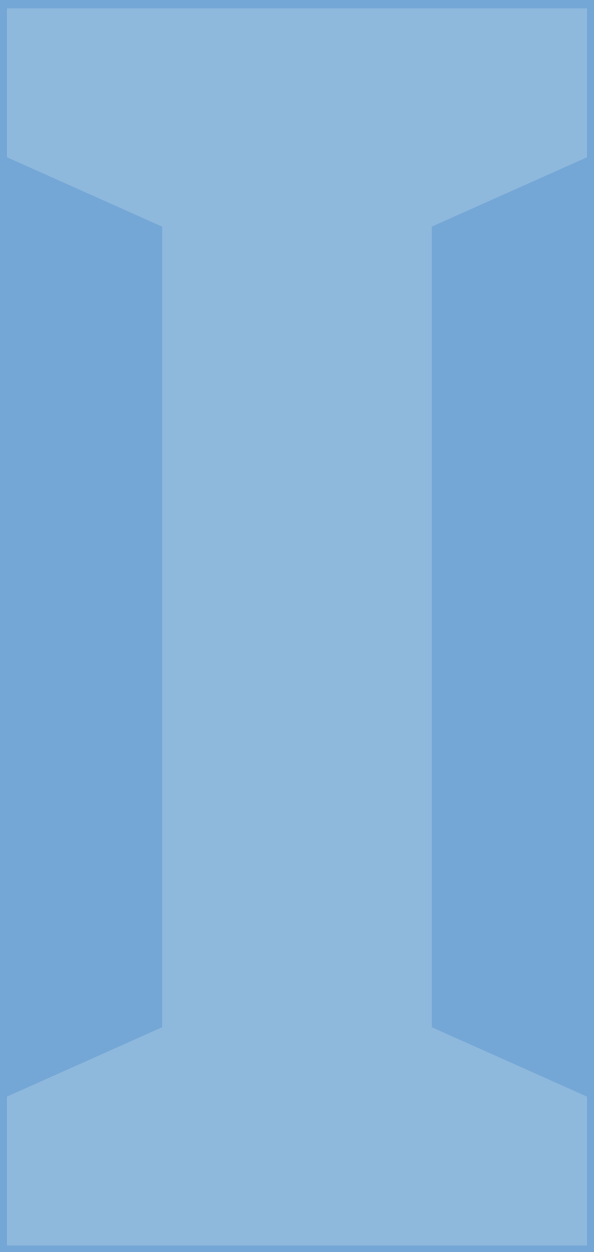


Appendix I:

ForgeSolar Glare Analysis

FORGESOLAR GLARE ANALYSIS

Project: **Elm Lawn Solar Park**
A 2MW solar facility located northeast of Litchfield in Montgomery, Illinois

Site configuration: **Elm Lawn 1**
Calculated via ForgeSolar Radiometric Physics Engine v3.1.0

Created 15 Mar, 2026
Updated 16 Mar, 2026
Time-step 1 minute
Timezone offset UTC-6
Minimum sun altitude 0.0 deg
DNI peaks at 1,000.0 W/m^2
Category 1 MW to 5 MW
Site ID 173172.28717

Ocular transmission coefficient 0.5
Pupil diameter 0.002 m
Eye focal length 0.017 m
Sun subtended angle 9.3 mrad

Sun dominance mitigation Enabled

Summary of Results no glare found

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
Operational Area 1	SA tracking	SA tracking	0	0.0	0	0.0	-
Operational Area 2	SA tracking	SA tracking	0	0.0	0	0.0	-

Component Data

PV Arrays

Name: Operational Area 1
Axis tracking: Single-axis rotation
Backtracking: Shade
Tracking axis orientation: 180.0°
Max tracking angle: 55.0°
Resting angle: 5.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth glass with AR coating (revised)

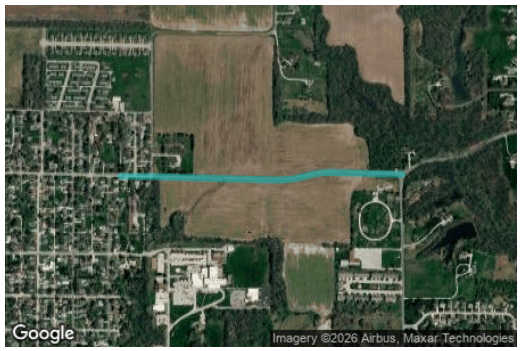
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	39.185322	-89.636388	690.02	0.00	690.02
2	39.184532	-89.636399	689.27	0.00	689.27
3	39.184548	-89.633856	687.92	0.00	687.92
4	39.185313	-89.633846	683.20	0.00	683.20

Name: Operational Area 2
Axis tracking: Single-axis rotation
Backtracking: Shade
Tracking axis orientation: 180.0°
Max tracking angle: 55.0°
Resting angle: 5.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth glass with AR coating (revised)

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	39.183708	-89.636324	688.60	0.00	688.60
2	39.182469	-89.636292	686.87	0.00	686.87
3	39.182469	-89.634285	688.04	0.00	688.04
4	39.183742	-89.634307	689.42	0.00	689.42

Route Receptors

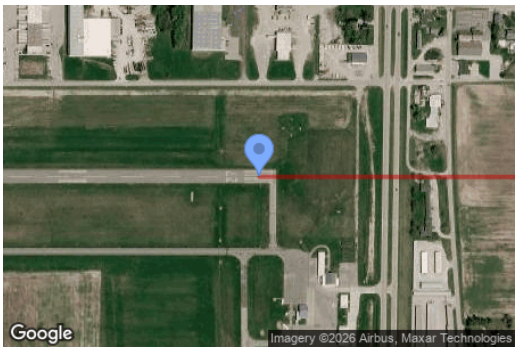
Name: E Clark St
Path type: Two-way
Azimuthal view angle: 50.0°
Downward view angle: 90.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	39.184107	-89.642448	685.45	0.00	685.45
2	39.184107	-89.641890	684.89	0.00	684.89
3	39.184103	-89.641284	684.62	0.00	684.62
4	39.184035	-89.638250	687.46	0.00	687.46
5	39.184006	-89.636705	689.19	0.00	689.19
6	39.184008	-89.636354	689.90	0.00	689.90
7	39.184014	-89.636180	689.95	0.00	689.95
8	39.184031	-89.635973	690.26	0.00	690.26
9	39.184051	-89.635839	690.50	0.00	690.50
10	39.184119	-89.635465	690.79	0.00	690.79
11	39.184163	-89.635264	690.97	0.00	690.97
12	39.184194	-89.635036	691.05	0.00	691.05
13	39.184212	-89.634827	691.03	0.00	691.03
14	39.184221	-89.634655	691.22	0.00	691.22
15	39.184221	-89.634526	691.12	0.00	691.12
16	39.184211	-89.633952	689.20	0.00	689.20
17	39.184196	-89.633324	685.83	0.00	685.83
18	39.184178	-89.632498	678.87	0.00	678.87
19	39.184178	-89.632181	676.16	0.00	676.16
20	39.184161	-89.631851	673.30	0.00	673.30

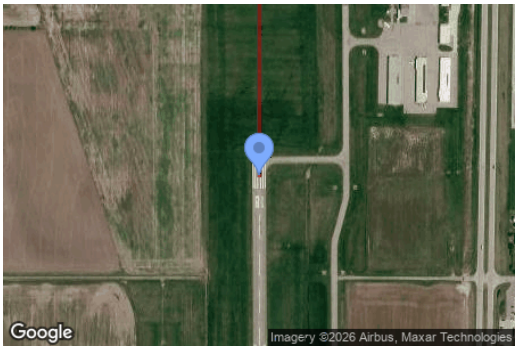
Flight Path Receptors

Name: FP East
Description:
Threshold height: 50 ft
Direction: 270.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



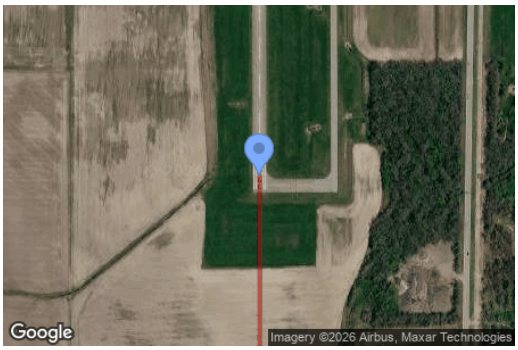
Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	39.167348	-89.670477	690.43	50.00	740.43
Two-mile	39.167333	-89.633141	666.68	627.17	1293.86

Name: FP North
Description:
Threshold height: 50 ft
Direction: 180.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



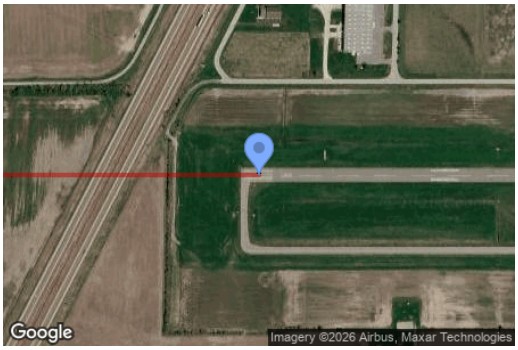
Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	39.162964	-89.672386	685.41	50.00	735.41
Two-mile	39.191876	-89.672386	670.64	618.20	1288.83

Name: FP South
Description:
Threshold height: 50 ft
Direction: 0.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	39.152498	-89.672338	680.11	50.00	730.11
Two-mile	39.123585	-89.672338	668.37	615.16	1283.54

Name: FP West
Description:
Threshold height: 50 ft
Direction: 90.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	39.167359	-89.683569	682.17	50.00	732.17
Two-mile	39.167359	-89.720904	661.00	624.60	1285.60

Discrete Observation Point Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	39.186652	-89.635411	689.96	20.00
OP 2	2	39.187519	-89.635870	692.70	20.00
OP 3	3	39.184426	-89.640454	688.02	12.00
OP 4	4	39.184970	-89.640596	688.89	12.00
OP 5	5	39.181232	-89.634147	684.19	8.00
OP 6	6	39.180933	-89.634155	683.46	8.00
OP 7	7	39.183726	-89.636829	687.77	12.00
OP 8	8	39.183535	-89.636839	687.51	12.00
OP 9	9	39.183340	-89.636845	687.25	12.00
OP 10	10	39.183152	-89.636861	687.08	12.00
OP 11	11	39.182974	-89.636866	686.97	12.00
OP 12	12	39.182799	-89.636872	686.82	12.00
OP 13	13	39.182624	-89.636877	686.72	12.00

Obstruction Components

Name: Obstruction 10
Top height: 60.0 ft

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	39.186035	-89.636682	691.31
2	39.185611	-89.636692	690.36
3	39.185602	-89.633602	682.30
4	39.185286	-89.633592	682.01
5	39.185120	-89.633120	683.07
6	39.184280	-89.633109	683.66
7	39.184280	-89.632336	677.17

Name: Obstruction 2
Top height: 50.0 ft

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	39.185301	-89.639661	688.08
2	39.184831	-89.639650	686.81

Name: Obstruction 3
Top height: 40.0 ft

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	39.184891	-89.639962	687.43
2	39.184702	-89.640069	687.10

Name: Obstruction 4
Top height: 50.0 ft

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	39.184001	-89.640946	684.15
2	39.183012	-89.640946	682.30

Name: Obstruction 5
Top height: 40.0 ft

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	39.183062	-89.639970	681.69
2	39.182330	-89.639980	683.59
3	39.182272	-89.636225	686.57
4	39.180184	-89.636161	681.33

Name: Obstruction 6
Top height: 32.8 ft

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	39.182130	-89.634755	687.65
2	39.182126	-89.633811	686.46

Glare Analysis Results

Summary of Results no glare found

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
Operational Area 1	SA tracking	SA tracking	0	0.0	0	0.0	-
Operational Area 2	SA tracking	SA tracking	0	0.0	0	0.0	-

PV: Operational Area 1 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
E Clark St	0	0.0	0	0.0
FP East	0	0.0	0	0.0
FP North	0	0.0	0	0.0
FP South	0	0.0	0	0.0
FP West	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0

Operational Area 1 and Route: E Clark St

No glare found

Operational Area 1 and FP: FP East

No glare found

Operational Area 1 and FP: FP North

No glare found

PV: Operational Area 1 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
E Clark St	0	0.0	0	0.0
FP East	0	0.0	0	0.0
FP North	0	0.0	0	0.0
FP South	0	0.0	0	0.0
FP West	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0

Operational Area 1 and Route: E Clark St

No glare found

Operational Area 1 and FP: FP East

No glare found

Operational Area 1 and FP: FP North

No glare found

Operational Area 1 and FP: FP South

No glare found

Operational Area 1 and FP: FP West

No glare found

Operational Area 1 and OP 1

No glare found

Operational Area 1 and OP 2

No glare found

Operational Area 1 and OP 3

No glare found

Operational Area 1 and OP 4

No glare found

Operational Area 1 and OP 5

No glare found

Operational Area 1 and OP 6

No glare found

Operational Area 1 and OP 7

No glare found

Operational Area 1 and OP 8

No glare found

Operational Area 1 and OP 9

No glare found

Operational Area 1 and OP 10

No glare found

Operational Area 1 and OP 11

No glare found

Operational Area 1 and OP 12

No glare found

Operational Area 1 and OP 13

No glare found

PV: Operational Area 2 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
E Clark St	0	0.0	0	0.0
FP East	0	0.0	0	0.0
FP North	0	0.0	0	0.0
FP South	0	0.0	0	0.0
FP West	0	0.0	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0

Operational Area 2 and Route: E Clark St

No glare found

Operational Area 2 and FP: FP East

No glare found

Operational Area 2 and FP: FP North

No glare found

Operational Area 2 and FP: FP South

No glare found

Operational Area 2 and FP: FP West

No glare found

Operational Area 2 and OP 1

No glare found

Operational Area 2 and OP 2

No glare found

Operational Area 2 and OP 3

No glare found

Operational Area 2 and OP 4

No glare found

Operational Area 2 and OP 5

No glare found

Operational Area 2 and OP 6

No glare found

Operational Area 2 and OP 7

No glare found

Operational Area 2 and OP 8

No glare found

Operational Area 2 and OP 9

No glare found

Operational Area 2 and OP 10

No glare found

Operational Area 2 and OP 11

No glare found

Operational Area 2 and OP 12

No glare found

Operational Area 2 and OP 13

No glare found

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
The algorithm does not rigorously represent the detailed geometry of a system; detailed features such as gaps between modules, variable height of the PV array, and support structures may impact actual glare results. However, we have validated our models against several systems, including a PV array causing glare to the air-traffic control tower at Manchester-Boston Regional Airport and several sites in Albuquerque, and the tool accurately predicted the occurrence and intensity of glare at different times and days of the year.
Random number computations are utilized by various steps of the annual hazard analysis algorithm. Predicted minutes of glare can vary between runs as a result. This limitation primarily affects analyses of Observation Point receptors, including ATCTs. Note that the SGHAT/ ForgeSolar methodology has always relied on an analytical, qualitative approach to accurately determine the overall hazard (i.e. green vs. yellow) of expected glare on an annual basis.
The analysis does not automatically consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare, such as trees, hills, buildings, etc.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
The variable direct normal irradiance (DNI) feature (if selected) scales the user-prescribed peak DNI using a typical clear-day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum at solar noon. The scaling uses a clear-day irradiance profile based on a normalized time relative to sunrise, solar noon, and sunset, which are prescribed by a sun-position algorithm and the latitude and longitude obtained from Google maps. The actual DNI on any given day can be affected by cloud cover, atmospheric attenuation, and other environmental factors.
The ocular hazard predicted by the tool depends on a number of environmental, optical, and human factors, which can be uncertain. We provide input fields and typical ranges of values for these factors so that the user can vary these parameters to see if they have an impact on the results. The speed of SGHAT allows expedited sensitivity and parametric analyses.
The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Refer to the Help page at **www.forgesolar.com/help/** for assumptions and limitations not listed here.

Default glare analysis parameters and observer eye characteristics (for reference only):

- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

This analysis was conducted using the best available radiometric modeling at the time of generation. Future updates to the modeling methodology may yield different results.

J

Appendix J:

Health and Safety Impacts of Solar PV

WHITE PAPER

Health and Safety Impacts of Solar Photovoltaics

By Tommy Cleveland
May 2017

NC CLEAN ENERGY TECHNOLOGY CENTER

NC STATE UNIVERSITY

Contents

Health and Safety Impacts of Solar Photovoltaics

The increasing presence of utility-scale solar photovoltaic (PV) systems (sometimes referred to as solar farms) is a rather new development in North Carolina's landscape. Due to the new and unknown nature of this technology, it is natural for communities near such developments to be concerned about health and safety impacts. Unfortunately, the quick emergence of utility-scale solar has cultivated fertile grounds for myths and half-truths about the health impacts of this technology, which can lead to unnecessary fear and conflict.

Photovoltaic (PV) technologies and solar inverters are not known to pose any significant health dangers to their neighbors. The most important dangers posed are increased highway traffic during the relative short construction period and dangers posed to trespassers of contact with high voltage equipment. This latter risk is mitigated by signage and the security measures that industry uses to deter trespassing. As will be discussed in more detail below, risks of site contamination are much less than for most other industrial uses because PV technologies employ few toxic chemicals and those used are used in very small quantities. Due to the reduction in the pollution from fossil-fuel-fired electric generators, the overall impact of solar development on human health is overwhelmingly positive. This pollution reduction results from a partial replacement of fossil-fuel fired generation by emission-free PV-generated electricity, which reduces harmful sulfur dioxide (SO2), nitrogen oxides (NOx), and fine particulate matter (PM2.5). Analysis from the National Renewable Energy Laboratory and the Lawrence Berkeley National Laboratory, both affiliates of the U.S. Department of Energy, estimates the health-related air quality benefits to the southeast region from solar PV generators to be worth 8.0 ¢ per kilowatt-hour of solar generation.[1]

This is in addition to the value of the electricity and suggests that the air quality benefits of solar are worth more than the electricity itself.

Even though we have only recently seen large-scale installation of PV technologies, the technology and its potential impacts have been studied since the 1950s. A combination of this solar-specific research and general scientific research has led to the scientific community having a good understanding of the science behind potential health and safety impacts of solar energy. This paper utilizes the latest scientific literature and knowledge of solar practices in N.C. to address the health and safety risks associated with solar PV technology. These risks are extremely small, far less than those associated with common activities such as driving a car, and vastly outweighed by health benefits of the generation of clean electricity.

This paper addresses the potential health and safety impacts of solar PV development in North Carolina, organized into the following four categories:
(1) Hazardous Materials
(2) Electromagnetic Fields (EMF)
(3) Electric Shock and Arc Flash
(4) Fire Safety

1 • Hazardous Materials

One of the more common concerns towards solar is that the panels (referred to as "modules" in the solar industry) consist of toxic materials that endanger public health. However, as shown in this section, solar energy systems may contain small amounts of toxic materials, but these materials do not endanger public health. To understand potential toxic hazards coming from a solar project, one

must understand system installation, materials used, the panel end-of-life protocols, and system operation. This section will examine these aspects of a solar farm and the potential for toxicity impacts in the following subsections:

(1.2) Project Installation/Construction
(1.2) System Components
  1.2.1 Solar Panels: Construction and Durability
  1.2.2 Photovoltaic technologies
    (a) Crystalline Silicon
    (b) Cadmium Telluride (CdTe)
    (c) CIS/CIGS
  1.2.3 Panel End of Life Management
  1.2.4 Non-panel System Components
(1.3) Operations and Maintenance

1.1 Project Installation/ Construction

The system installation, or construction, process does not require toxic chemicals or processes. The site is mechanically cleared of large vegetation, fences are constructed, and the land is surveyed to layout exact installation locations. Trenches for underground wiring are dug and support posts are driven into the ground. The solar panels are bolted to steel and aluminum support structures and wired together. Inverter pads are installed, and an inverter and transformer are installed on each pad. Once everything is connected, the system is tested, and only then turned on.

Figure 1: Utility-scale solar facility (5 MWAC) located in Catawba County. *Source: Strata Solar*

1.2 • System Components

1.2.1 Solar Panels: Construction and Durability

Solar PV panels typically consist of glass, polymer, aluminum, copper, and semiconductor materials that can be recovered and recycled at the end of their useful life.[2] Today there are two PV technologies used in PV panels at utility-scale solar facilities, silicon, and thin film. As of 2016, all thin film used in North Carolina solar facilities are cadmium telluride (CdTe) panels from the US manufacturer First Solar, but there are other thin film PV panels available on the market, such as Solar Frontier's CIGS panels. Crystalline silicon technology consists of silicon wafers which are made into cells and assembled into panels, thin film technologies consist of thin layers of semiconductor material deposited onto glass, polymer or metal substrates. While there are differences in the components and manufacturing processes of these two types of solar technologies, many aspects of their PV panel construction are very similar. Specifics about each type of PV chemistry as it relates to toxicity are covered in subsections a, b, and c in section 1.2.2; on crystalline silicon, cadmium telluride, and CIS/CIGS respectively. The rest of this section applies equally to both silicon and thin film panels.

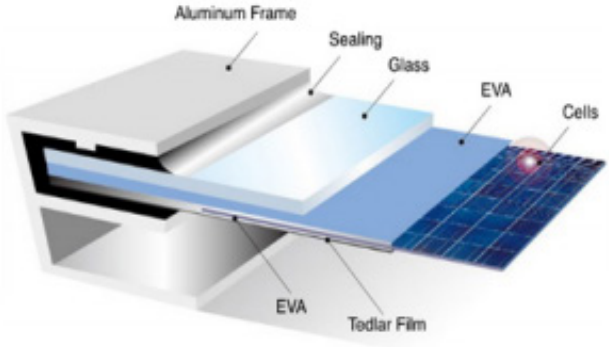


Figure 2: Components of crystalline silicon panels. The vast majority of silicon panels consist of a glass sheet on the topside with an aluminum frame providing structural support. Image Source: www.riteksolar.com.tw

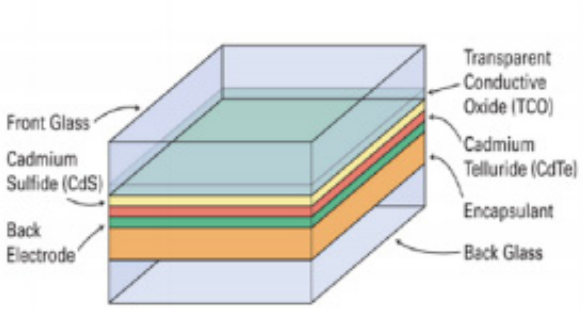


Figure 3: Layers of a common frameless thin-film panel (CdTe). Many thin film panels are frameless, including the most common thin-film panels, First Solar's CdTe. Frameless panels have protective glass on both the front and back of the panel. Layer thicknesses not to scale. Image Source: www.homepower.com

To provide decades of corrosion-free operation, PV cells in PV panels are encapsulated from air and moisture between two layers of plastic. The encapsulation layers are protected on the top with a layer of tempered glass and on the backside with a polymer sheet. Frameless modules include a protective layer of glass on the rear of the panel, which may also be tempered. The plastic ethylene-vinyl acetate (EVA) commonly provides the cell encapsulation. For decades, this same material has been used between layers of tempered glass to give car windshields and hurricane windows their great strength. In the same way that a car windshield cracks but stays intact, the EVA layers in PV panels keep broken panels intact (see Figure 4). Thus, a damaged module does not generally create small pieces of debris; instead, it largely remains together as one piece.

Figure 4: The mangled PV panels in this picture illustrate the nature of broken solar panels; the glass cracks but the panel is still in one piece. Image Source: http://img.alibaba.com/photo/115259576/broken_solar_panel.jpg

PV panels constructed with the same basic components as modern panels have been installed across the globe for well over thirty years.[3] The long-term durability and performance demonstrated over these decades, as well as the results of accelerated lifetime testing, helped lead to an industrystandard 25-year power production warranty for PV panels. These power warranties warrant a PV panel to produce at least 80% of their original nameplate production after 25 years of use. A recent SolarCity and DNV GL study reported that today's quality PV panels should be expected to reliably and efficiently produce power for thirty-five years.[4]

Local building codes require all structures, including ground mounted solar arrays, to be engineered to withstand anticipated wind speeds, as defined by the local wind speed requirements. Many racking products are available in versions engineered for wind speeds of up to 150 miles per hour, which is significantly higher than the wind speed requirement anywhere in North Carolina. The strength of PV mounting structures were demonstrated during Hurricane Sandy in 2012 and again during Hurricane Matthew in 2016. During Hurricane Sandy, the many large-scale solar facilities in New Jersey and New York at that time suffered only minor damage.[5] In the fall of 2016, the US and Caribbean experienced destructive winds and torrential rains from Hurricane Matthew, yet one leading solar tracker manufacturer reported that their numerous systems in the impacted area received zero damage from wind or flooding.[6]

In the event of a catastrophic event capable of damaging solar equipment, such as a tornado, the system will almost certainly have property insurance

that will cover the cost to cleanup and repair the project. It is in the best interest of the system owner to protect their investment against such risks. It is also in their interest to get the project repaired and producing full power as soon as possible. Therefore, the investment in adequate insurance is a wise business practice for the system owner. For the same reasons, adequate insurance coverage is also generally a requirement of the bank or firm providing financing for the project.

1.2.2 Photovoltaic (PV) Technologies

a. Crystalline Silicon

This subsection explores the toxicity of silicon-based PV panels and concludes that they do not pose a material risk of toxicity to public health and safety. Modern crystalline silicon PV panels, which account for over 90% of solar PV panels installed today, are, more or less, a commodity product. The overwhelming majority of panels installed in North Carolina are crystalline silicon panels that are informally classified as Tier I panels. Tier I panels are from well-respected manufacturers that have a good chance of being able to honor warranty claims. Tier I panels are understood to be of high quality, with predictable performance, durability, and content. Well over 80% (by weight) of the content of a PV panel is the tempered glass front and the aluminum frame, both of which are common building materials. Most of the remaining portion are common plastics, including polyethylene terephthalate in the backsheet, EVA encapsulation of the PV cells, polyphenyl ether in the junction box, and polyethylene insulation on the wire leads. The active, working components of the system are the silicon photovoltaic cells, the small electrical leads connecting them together, and to the wires coming out of the back of the panel. The electricity generating and conducting components makeup less than 5% of the weight of most panels. The PV cell itself is nearly 100% silicon, and silicon is the second most common element in the Earth's crust. The silicon for PV cells is obtained by high-temperature processing of quartz sand (SiO2) that removes its oxygen molecules. The refined silicon is converted to a PV cell by adding extremely small amounts of boron and phosphorus, both of which are common and of very low toxicity.

The other minor components of the PV cell are also generally benign; however, some contain lead, which is a human toxicant that is particularly harmful to young children. The minor components include an extremely thin antireflective coating (silicon nitride or titanium dioxide), a thin layer of aluminum on the rear, and thin strips of silver alloy that are screen-printed on the front and rear of cell.[7] In order for the front and rear electrodes to make effective electrical contact with the proper layer of the PV cell, other materials (called glass frit) are mixed with the silver alloy and then heated to etch the metals into the cell. This glass frit historically contains a small amount of lead (Pb) in the form of lead oxide. The 60 or 72 PV cells in a PV panel are connected by soldering thin solder-covered copper tabs from the back of one cell to the front of the next cell. Traditionally a tin-based solder containing some lead (Pb) is used, but some manufacturers have switched to lead-free solder. The glass frit and/or the solder may contain trace amounts of other metals, potentially including some with human toxicity such as cadmium. However, testing to simulate the potential for leaching from broken panels, which is discussed in more detail below, did not find a potential toxicity threat from these trace elements. Therefore, the tiny amount of lead in the grass frit and the solder is the only part of silicon PV panels with a potential to create a negative health impact. However, as described below, the very limited amount of lead involved and its strong physical and chemical attachment to other components of the PV panel means that even in worst-case scenarios the health hazard it poses is insignificant.

As with many electronic industries, the solder in silicon PV panels has historically been a leadbased solder, often 36% lead, due to the superior properties of such solder. However, recent advances in lead-free solders have spurred a trend among PV panel manufacturers to reduce or remove the lead in their panels. According to the 2015 Solar Scorecard from the Silicon Valley Toxics Coalition, a group that tracks environmental responsibility of photovoltaic panel manufacturers, fourteen companies (increased from twelve companies in 2014) manufacture PV panels certified to meet the European Restriction of Hazardous Substances (RoHS) standard. This means that the amount of cadmium and lead in the panels they manufacture fall below the RoHS thresholds, which are set by the European Union and serve as the world's de facto standard for hazardous substances in manufactured goods.[8] The Restriction of Hazardous Substances (RoHS) standard requires that the maximum concentration found in any homogenous material in a produce is less than 0.01% cadmium and less than 0.10% lead, therefore, any solder can be no more than 0.10% lead.[9]

While some manufacturers are producing PV panels that meet the RoHS standard, there is no requirement that they do so because the RoHS Directive explicitly states that the directive does not apply to photovoltaic panels.[10] The justification for this is provided in item 17 of the current RoHS Directive: "The development of renewable forms of energy is one of the Union's key objectives, and the contribution made by renewable energy sources to environmental and climate objectives is crucial. Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources (4) recalls that there should be coherence between those objectives and other Union environmental legislation. Consequently, this Directive should not prevent the development of renewable energy technologies that have no negative impact on health and the environment and that are sustainable and economically viable."

The use of lead is common in our modern economy. However, only about 0.5% of the annual lead consumption in the U.S. is for electronic solder for all uses; PV solder makes up only a tiny portion of this 0.5%. Close to 90% of lead consumption in the US is in batteries, which do not encapsulate the pounds of lead contained in each typical automotive battery. This puts the lead in batteries at great risk of leaching into the environment. Estimates for the lead in a single PV panel with leadbased solder range from 1.6 to 24 grams of lead, with 13g (less than half of an ounce) per panel seen most often in the literature.[11] At 13 g/panel[12], each panel contains one-half of the lead in a typical 12-gauge shotgun shell. This amount equates to roughly 1/750th of the lead in a single car battery. In a panel, it is all durably encapsulated from air or water for the full life of the panel.[14]

As indicated by their 20 to 30-year power warranty, PV modules are designed for a long service life, generally over 25 years. For a panel to comply with its 25-year power warranty, its internal components, including lead, must be sealed from any moisture. Otherwise, they would corrode and the panel's output would fall below power warranty levels. Thus, the lead in operating PV modules is not at risk of release to the environment during their service lifetime. In extreme experiments, researchers have shown that lead can leach from crushed or pulverized panels.[15, 16] However, more real-world tests designed to represent typical trash compaction that are used to classify waste as hazardous or non-hazardous show no danger from leaching.[17,18] For more information about PV panel end-of-life, see the Panel Disposal section.

As illustrated throughout this section, silicon-based PV panels do not pose a material threat to public health and safety. The only aspect of the panels with potential toxicity concerns is the very small amount of lead in some panels. However, any lead in a panel is well sealed from environmental exposure for the operating lifetime of the solar panel and thus not at risk of release into the environment.

b. Cadmium Telluride (CdTe) PV Panels

This subsection examines the components of a cadmium telluride (CdTe) PV panel. Research demonstrates that they pose negligible toxicity risk to public health and safety while significantly reducing the public's exposure to cadmium by reducing coal emissions. As of mid-2016, a few hundred MWs of cadmium telluride (CdTe) panels, all manufactured by the U.S. company First Solar, have been installed in North Carolina.

Questions about the potential health and environmental impacts from the use of this PV technology are related to the concern that these panels contain cadmium, a toxic heavy metal. However, scientific studies have shown that cadmium telluride differs from cadmium due to its high chemical and thermal stability.[19] Research has shown that the tiny amount of cadmium in these panels does not pose a health or safety risk.[20] Further, there are very compelling reasons to welcome its adoption due to reductions in unhealthy pollution associated with burning coal. Every GWh of electricity generated by burning coal produces about 4 grams of cadmium air emissions.[21] Even though North Carolina produces a significant fraction of our electricity from coal, electricity from solar offsets much more natural gas than coal due to natural gas plants being able to adjust their rate of production more easily and quickly. If solar electricity offsets 90% natural gas and 10% coal, each 5-megawatt (5 MWAC, which is generally 7 MWDC) CdTe solar facility in North Carolina keeps about 157 grams, or about a third of a pound, of cadmium *out* of our environment.[22, 23]

Cadmium is toxic, but all the approximately 7 grams of cadmium in one CdTe panel is in the form of a chemical compound cadmium telluride,[24] which has 1/100th the toxicity of free cadmium.[25] Cadmium telluride is a very stable compound that is non-volatile and non-soluble in water. Even in the case of a fire, research shows that less than 0.1% of the cadmium is released when a CdTe panel is exposed to fire. The fire melts the glass and encapsulates over 99.9% of the cadmium in the molten glass.[27]

It is important to understand the source of the cadmium used to manufacture CdTe PV panels. The cadmium is a byproduct of zinc and lead refining. The element is collected from emissions and waste streams during the production of these metals and combined with tellurium to create the CdTe used in PV panels. If the cadmium were not collected for use in the PV panels or other products, it would otherwise either be stockpiled for future use, cemented and buried, or disposed of.[28] Nearly all the cadmium in old or broken panels can be recycled which can eventually serve as the primary source of cadmium for new PV panels.[29]

Similar to silicon-based PV panels, CdTe panels are constructed of a tempered glass front, one instead of two clear plastic encapsulation layers, and a rear heat strengthened glass backing (together >98% by weight). The final product is built to withstand exposure to the elements without significant damage for over 25 years. While not representative of damage that may occur in the field or even at a landfill, laboratory evidence has illustrated that when panels are ground into a fine powder, very acidic water is able to leach portions of the cadmium and tellurium,[30] similar to the process used to recycle CdTe panels. Like many silicon-based panels, CdTe panels are reported (as far back ask 1998[31] to pass the EPA's Toxic Characteristic Leaching Procedure (TCLP) test, which tests the potential for crushed panels in a landfill to leach hazardous substances into groundwater.[32] Passing this test means that they are classified as non-hazardous waste and can be deposited in landfills.[33,34] For more information about PV panel end-of-life, see the Panel Disposal section.

There is also concern of environmental impact resulting from potential catastrophic events involving CdTe PV panels. An analysis of worst-case scenarios for environmental impact from CdTe PV

panels, including earthquakes, fires, and floods, was conducted by the University of Tokyo in 2013. After reviewing the extensive international body of research on CdTe PV technology, their report concluded, "Even in the worst-case scenarios, it is unlikely that the Cd concentrations in air and sea water will exceed the environmental regulation values."[35] In a worst-case scenario of damaged panels abandoned on the ground, insignificant amounts of cadmium will leach from the panels. This is because this scenario is much less conducive (larger module pieces, less acidity) to leaching than the conditions of the EPA's TCLP test used to simulate landfill conditions, which CdTe panels pass.[36]

First Solar, a U.S. company, and the only significant supplier of CdTe panels, has a robust panel take-back and recycling program that has been operating commercially since 2005.[37] The company states that it is "committed to providing a commercially attractive recycling solution for photovoltaic (PV) power plant and module owners to help them meet their module (end of life) EOL obligation simply, costeffectively and responsibly." First Solar global recycling services to their customers to collect and recycle panels once they reach the end of productive life whether due to age or damage. These recycling service agreements are structured to be financially attractive to both First Solar and the solar panel owner. For First Solar, the contract provides the company with an affordable source of raw materials needed for new panels and presumably a diminished risk of undesired release of Cd. The contract also benefits the solar panel owner by allowing them to avoid tipping fees at a waste disposal site. The legal contract helps provide peace of mind by ensuring compliance by both parties when considering the continuing trend of rising disposal costs and increasing regulatory requirements.

c. CIS/CIGS and other PV technologies

Copper indium gallium selenide PV technology, often referred to as CIGS, is the second most common type of thin-film PV panel but a distant second behind CdTe. CIGS cells are composed of a thin layer of copper, indium, gallium, and selenium on a glass or plastic backing. None of these elements are very toxic, although selenium is a regulated metal under the Federal Resource Conservation and Recovery Act (RCRA).[38] The cells often also have an extremely thin layer of cadmium sulfide that contains a tiny amount of cadmium, which is toxic. The promise of high efficiency CIGS panels drove heavy investment in this technology in the past. However, researchers have struggled to transfer high efficiency success in the lab to low-cost full-scale panels in the field.[39] Recently, a CIGS manufacturer based in Japan, Solar Frontier, has achieved some market success with a rigid, glass-faced CIGS module that competes with silicon panels. Solar Frontier produces the majority of CIS panels on the market today.[40] Notably, these panels are RoHS compliant,[41] thus meeting the rigorous toxicity standard adopted by the European Union even thought this directive exempts PV panels. The authors are unaware of any completed or proposed utility-scale system in North Carolina using CIS/CIGS panels.

1.2.3 Panel End-of-Life Management

Concerns about the volume, disposal, toxicity, and recycling of PV panels are addressed in this subsection. To put the volume of PV waste into perspective, consider that by 2050, when PV systems installed in 2020 will reach the end of their lives, it is estimated that the global annual PV panel waste tonnage will be 10% of the 2014 global e-waste tonnage.[42] In the U.S., end-of-life disposal of solar products is governed by the Federal Resource Conservation and Recovery Act (RCRA), as well as state policies in some situations. RCRA separates waste into hazardous (not accepted at ordinary landfill) and solid waste (generally accepted

at ordinary landfill) based on a series of rules. According to RCRA, the way to determine if a PV panel is classified as hazardous waste is the Toxic Characteristic Leaching Procedure (TCLP) test. This EPA test is designed to simulate landfill disposal and determine the risk of hazardous substances leaching out of the landfill.[43,44,45] Multiple sources report that most modern PV panels (both crystalline silicon and cadmium telluride) pass the TCLP test.[46,47] Some studies found that some older (1990s) crystalline silicon panels, and perhaps some newer crystalline silicon panels (specifics are not given about vintage of panels tested), do not pass the lead (Pb) leachate limits in the TCLP test.[48,49]

The test begins with the crushing of a panel into centimeter-sized pieces. The pieces are then mixed in an acid bath. After tumbling for eighteen hours, the fluid is tested for forty hazardous substances that all must be below specific threshold levels to pass the test. Research comparing TCLP conditions to conditions of damaged panels in the field found that simulated landfill conditions provide overly conservative estimates of leaching for field-damaged panels.[50] Additionally, research in Japan has found no detectable Cd leaching from cracked CdTe panels when exposed to simulated acid rain.[51]

Although modern panels can generally be landfilled, they can also be recycled. Even though recent waste volume has not been adequate to support significant PV-specific recycling infrastructure, the existing recycling industry in North Carolina reports that it recycles much of the current small volume of broken PV panels. In an informal survey conducted by the NC Clean Energy Technology Center survey in early 2016, seven of the eight large active North Carolina utility-scale solar developers surveyed reported that they send damaged panels back to the manufacturer and/or to a local recycler. Only one developer reported sending damaged panels to the landfill.

The developers reported at that time that they are usually paid a small amount per panel by local recycling firms. In early 2017, a PV developer reported that a local recycler was charging a small fee per panel to recycle damaged PV panels. The local recycling firm known to authors to accept PV panels described their current PV panel recycling practice as of early 2016 as removing the aluminum frame for local recycling and removing the wire leads for local copper recycling. The remainder of the panel is sent to a facility for processing the non-metallic portions of crushed vehicles, referred to as "fluff" in the recycling industry.[52] This processing within existing general recycling plants allows for significant material recovery of major components, including glass which is 80% of the module weight, but at lower yields than PV-specific recycling plants. Notably almost half of the material value in a PV panel is in the few grams of silver contained in almost every PV panel produced today. In the long-term, dedicated PV panel recycling plants can increase treatment capacities and maximize revenues resulting in better output quality and the ability to recover a greater fraction of the useful materials.[53] PV-specific panel recycling technologies have been researched and implemented to some extent for the past decade, and have been shown to be able to recover over 95% of PV material (semiconductor) and over 90% of the glass in a PV panel.[54]

A look at global PV recycling trends hints at the future possibilities of the practice in our country. Europe installed MW-scale volumes of PV years before the U.S. In 2007, a public-private partnership between the European Union and the solar industry set up a voluntary collection and recycling system called PV CYCLE. This arrangement was later made mandatory under the EU's WEEE directive, a program for waste electrical and electronic equipment.[55] Its member companies (PV panel producers) fully finance the association. This makes it possible for end-users to return the member companies' defective panels for recycling at any of the over 300 collection points around

Europe without added costs. Additionally, PV CYCLE will pick up batches of 40 or more used panels at no cost to the user. This arrangement has been very successful, collecting and recycling over 13,000 tons by the end of 2015.[56]

In 2012, the WEEE Directive added the end-of-life collection and recycling of PV panels to its scope.[57] This directive is based on the principle of extended-producer-responsibility. It has a global impact because producers that want to sell into the EU market are legally responsible for end-of-life management. Starting in 2018, this directive targets that 85% of PV products "put in the market" in Europe are recovered and 80% is prepared for reuse and recycling.

The success of the PV panel collection and recycling practices in Europe provides promise for the future of recycling in the U.S. In mid-2016, the US Solar Energy Industry Association (SEIA) announced that they are starting a national solar panel recycling program with the guidance and support of many leading PV panel producers.[58] The program will aggregate the services offered by recycling vendors and PV manufacturers, which will make it easier for consumers to select a cost-effective and environmentally responsible end-of-life management solution for their PV products. According to SEIA, they are planning the program in an effort to make the entire industry landfill-free. In addition to the national recycling network program, the program will provide a portal for system owners and consumers with information on how to responsibly recycle their PV systems.

While a cautious approach toward the potential for negative environmental and/or health impacts from retired PV panels is fully warranted, this section has shown that the positive health impacts of reduced emissions from fossil fuel combustion from PV systems more than outweighs any potential risk. Testing shows that silicon and CdTe panels are both safe to dispose of in landfills, and are also safe in worst case conditions of abandonment or damage in a disaster. Additionally, analysis by local engineers has found that the current salvage value of the equipment in a utility scale PV facility generally exceeds general contractor estimates for the cost to remove the entire PV system.[59,60,61]

1.2.4 Non-Panel System Components

(racking, wiring, inverter, transformer)

While previous toxicity subsections discussed PV panels, this subsection describes the non-panel components of utility-scale PV systems and investigates any potential public health and safety concerns. The most significant non-panel component of a ground-mounted PV system is the mounting structure of the rows of panels, commonly referred to as "racking". The vertical post portion of the racking is galvanized steel and the remaining above-ground racking components are either galvanized steel or aluminum, which are both extremely common and benign building materials. The inverters that make the solar generated electricity ready to send to the grid have weather-proof steel enclosures that protect the working components from the elements. The only fluids that they might contain are associated with their cooling systems, which are not unlike the cooling system in a computer. Many inverters today are RoHS compliant.

The electrical transformers (to boost the inverter output voltage to the voltage of the utility connection point) do contain a liquid cooling oil. However, the fluid used for that function is either a nontoxic mineral oil or a biodegradable non-toxic vegetable oil, such as BIOTEMP from ABB. These vegetable transformer oils have the additional advantage of being much less flammable than traditional mineral oils. Significant health hazards are associated with old transformers containing cooling oil with toxic PCBs. Transfers with PCB-containing oil were common before PCBs were outlawed in the U.S. in 1979. PCBs still exist in older transformers in the field across the country.

Other than a few utility research sites, there are no batteries on- or off-site associated with utility-scale solar energy facilities in North Carolina, avoiding any potential health or safety concerns related to battery technologies. However, as battery technologies continue to improve and prices continue to decline we are likely to start seeing some batteries at solar facilities. Lithium ion batteries currently dominate the world utility-scale battery market, which are not very toxic. No non-panel system components were found to pose any health or environmental dangers.

1.4 Operations and Maintenance – Panel Washing and Vegetation Control

Throughout the eastern U.S., the climate provides frequent and heavy enough rain to keep panels adequately clean. This dependable weather pattern eliminates the need to wash the panels on a regular basis. Some system owners may choose to wash panels as often as once a year to increase production, but most in N.C. do not regularly wash any PV panels. Dirt build up over time may justify panel washing a few times over the panels' lifetime; however, nothing more than soap and water are required for this activity.

The maintenance of ground-mounted PV facilities requires that vegetation be kept low, both for aesthetics and to avoid shading of the PV panels. Several approaches are used to maintain vegetation at NC solar facilities, including planting of limited-height species, mowing, weed-eating, herbicides, and grazing livestock (sheep). The following descriptions of vegetation maintenance practices are based on interviews with several solar developers as well as with three maintenance firms that together are contracted to maintain well over 100 of the solar facilities in N.C. The majority of solar facilities in North Carolina maintain vegetation primarily by mowing. Each row of panels has a single row of supports, allowing sickle mowers to mow under the panels. The sites usually require mowing about once a month during the growing season. Some sites employ sheep to graze the site, which greatly reduces the human effort required to maintain the vegetation and produces high quality lamb meat.[62]

In addition to mowing and weed eating, solar facilities often use some herbicides. Solar facilities generally do not spray herbicides over the entire acreage; rather they apply them only in strategic locations such as at the base of the perimeter fence, around exterior vegetative buffer, on interior dirt roads, and near the panel support posts. Also unlike many row crop operations, solar facilities generally use only general use herbicides, which are available over the counter, as opposed to restricted use herbicides commonly used in commercial agriculture that require a special restricted use license. The herbicides used at solar facilities are primarily 2-4-D and glyphosate (Round-up®), which are two of the most common herbicides used in lawns, parks, and agriculture across the country. One maintenance firm that was interviewed sprays the grass with a class of herbicide known as a growth regulator in order to slow the growth of grass so that mowing is only required twice a year. Growth regulators are commonly used on highway roadsides and golf courses for the same purpose. A commercial pesticide applicator license is required for anyone other than the landowner to apply herbicides, which helps ensure that all applicators are adequately educated about proper herbicide use and application. The license must be renewed annually and requires passing of a certification exam appropriate to the area in which the applicator wishes to work. Based on the limited data available, it appears that solar facilities in N.C. generally use significantly less herbicides per acre than most commercial agriculture or lawn maintenance services.

2. Electromagnetic Fields (EMF)

PV systems do not emit any material during their operation; however, they do generate electromagnetic fields (EMF), sometimes referred to as radiation. EMF produced by electricity is non-ionizing radiation, meaning the radiation has enough energy to move atoms in a molecule around (experienced as heat), but not enough energy to remove electrons from an atom or molecule (ionize) or to damage DNA. As shown below, modern humans are all exposed to EMF throughout our daily lives without negative health impact. Someone outside of the fenced perimeter of a solar facility is not exposed to significant EMF from the solar facility. Therefore, there is no negative health impact from the EMF produced in a solar farm. The following paragraphs provide some additional background and detail to support this conclusion.

Since the 1970s, some have expressed concern over potential health consequences of EMF from electricity, but no studies have ever shown this EMF to cause health problems.[63] These concerns are based on some epidemiological studies that found a slight increase in childhood leukemia associated with average exposure to residential power-frequency magnetic fields above 0.3 to 0.4 μT (microteslas) (equal to 3.0 to 4.0 mG (milligauss)). μT and mG are both units used to measure magnetic field strength. For comparison, the average exposure for people in the U.S. is one mG or 0.1 μT, with about 1% of the population with an average exposure in excess of 0.4 μT (or 4 mG).[64] These epidemiological studies, which found an association but not a causal relationship, led the World Health Organization's International Agency for Research on Cancer (IARC) to classify ELF magnetic fields as "possibly carcinogenic to humans". Coffee also has this classification. This classification means there is limited evidence but not enough evidence to designate as either a "probable carcinogen" or "human carcinogen". Overall, there is very little concern that ELF EMF damages public health. The only concern that does exist is for long-term exposure above 0.4 μT (4 mG) that may have some connection to increased cases of childhood leukemia. In 1997, the National Academies of Science were directed by Congress to examine this concern and concluded:

"Based on a comprehensive evaluation of published studies relating to the effects of power-frequency electric and magnetic fields on cells, tissues, and organisms (including humans), the conclusion of the committee is that the current body of evidence does not show that exposure to these fields presents a human-health hazard. Specifically, no conclusive and consistent evidence shows that exposures to residential electric and magnetic fields produce cancer, adverse neurobehavioral effects, or reproductive and developmental effects."[65]

There are two aspects to electromagnetic fields, an electric field and a magnetic field. The electric field is generated by voltage and the magnetic field is generated by electric current, i.e., moving electrons. A task group of scientific experts convened by the World Health Organization (WHO) in 2005 concluded that there were no substantive health issues related to electric fields (0 to 100,000 Hz) at levels generally encountered by members of the public.[66] The relatively low voltages in a solar facility and the fact that electric fields are easily shielded (i.e., blocked) by common materials, such as plastic, metal, or soil means that there is no concern of negative health impacts from the electric fields generated by a solar facility. Thus, the remainder of this section addresses magnetic fields. Magnetic fields are not shielded by most common materials and thus can easily pass through them. Both types of fields are strongest close to the source of electric generation and weaken quickly with distance from the source.

The direct current (DC) electricity produced by PV panels produce stationary (0 Hz) electric and magnetic fields. Because of minimal concern about potential risks of stationary fields, little scientific research has examined stationary fields' impact on human health.[67] In even the largest PV facilities, the DC voltages and currents are not very high. One can illustrate the weakness of the EMF generated by a PV panel by placing a compass on an operating solar panel and observing that the needle still points north.

While the electricity throughout the majority of a solar site is DC electricity, the inverters convert this DC electricity to alternating current (AC) electricity matching the 60 Hz frequency of the grid. Therefore, the inverters and the wires delivering this power to the grid are producing non-stationary EMF, known as extremely low frequency (ELF) EMF, normally oscillating with a frequency of 60 Hz. This frequency is at the low-energy end of the electromagnetic spectrum. Therefore, it has less energy than other commonly encountered types of non-ionizing radiation like radio waves, infrared radiation, and visible light.

The wide use of electricity results in background levels of ELF EMFs in nearly all locations where people spend time – homes, workplaces, schools, cars, the supermarket, etc. A person's average exposure depends upon the sources they encounter, how close they are to them, and the amount of time they spend there.[68] As stated above, the average exposure to magnetic fields in the U.S. is estimated to be around one mG or 0.1 μT, but can vary considerably depending on a person's exposure to EMF from electrical devices and wiring.[69] At times we are often exposed to much higher ELF magnetic fields, for example when standing three feet from a refrigerator the ELF magnetic field is 6 mG and when standing three feet from a microwave oven the field is about 50 mG.[70] The strength of these fields diminish quickly with distance from the source, but when surrounded by electricity in our homes and other buildings moving away from one source moves you closer to another. However, unless you are inside of the fence at a utility-scale solar facility or electrical substation it is impossible to get very close to the EMF sources. Because of this, EMF levels at the fence of electrical substations containing high voltages and currents are considered "generally negligible".[71,72]

The strength of ELF-EMF present at the perimeter of a solar facility or near a PV system in a commercial or residential building is significantly lower than the typical American's average EMF exposure.[73,74] Researchers in Massachusetts measured magnetic fields at PV projects and found the magnetic fields dropped to very low levels of 0.5 mG or less, and in many cases to less than background levels (0.2 mG), at distances of no more than nine feet from the residential inverters and 150 feet from the utility-scale inverters.[75] Even when measured within a few feet of the utility-scale inverter, the ELF magnetic fields were well below the International Commission on Non-Ionizing Radiation Protection's recommended magnetic field level exposure limit for the general public of 2,000 mG.[76] It is typical that utility scale designs locate large inverters central to the PV panels that feed them because this minimizes the length of wire required and shields neighbors from the sound of the inverter's cooling fans. Thus, it is rare for a large PV inverter to be within 150 feet of the project's security fence.

Anyone relying on a medical device such as pacemaker or other implanted device to maintain proper heart rhythm may have concern about the potential for a solar project to interfere with the operation of his or her device. However, there is no reason for concern because the EMF outside of the solar facility's fence is less than 1/1000 of the level at which manufacturers test for ELF EMF interference, which is 1,000 mG.[77] Manufacturers of potentially affected implanted devices often provide advice on electromagnetic interference that includes avoiding letting the implanted device get too close to certain sources of fields such as some

household appliances, some walkie-talkies, and similar transmitting devices. Some manufacturers' literature does not mention high-voltage power lines, some say that exposure in public areas should not give interference, and some advise not spending extended periods of time close to power lines.[78]

3. Electric Shock and Arc Flash Hazards

There is a real danger of electric shock to anyone entering any of the electrical cabinets such as combiner boxes, disconnect switches, inverters, or transformers; or otherwise coming in contact with voltages over 50 Volts.[79] Another electrical hazard is an arc flash, which is an explosion of energy that can occur in a short circuit situation. This explosive release of energy causes a flash of heat and a shockwave, both of which can cause serious injury or death. Properly trained and equipped technicians and electricians know how to safely install, test, and repair PV systems, but there is always some risk of injury when hazardous voltages and/or currents are present. Untrained individuals should not attempt to inspect, test, or repair any aspect of a PV system due to the potential for injury or death due to electric shock and arc flash, The National Electric Code (NEC) requires appropriate levels of warning signs on all electrical components based on the level of danger determined by the voltages and current potentials. The national electric code also requires the site to be secured from unauthorized visitors with either a six-foot chain link fence with three strands of barbed wire or an eight-foot fence, both with adequate hazard warning signs.

4. Fire Safety

The possibility of fires resulting from or intensified by PV systems may trigger concern among the general public as well as among firefighters. However, concern over solar fire hazards should be limited because only a small portion of materials in the panels are flammable, and those components cannot self-support a significant fire. Flammable components of PV panels include the thin layers of polymer encapsulates surrounding the PV cells, polymer backsheets (framed panels only), plastic junction boxes on rear of panel, and insulation on wiring. The rest of the panel is composed of non-flammable components, notably including one or two layers of protective glass that make up over three quarters of the panel's weight.

Heat from a small flame is not adequate to ignite a PV panel, but heat from a more intense fire or energy from an electrical fault can ignite a PV panel.[80] One real-world example of this occurred during July 2015 in an arid area of California. Three acres of grass under a thin film PV facility burned without igniting the panels mounted on fixed-tilt racks just above the grass.[81] While it is possible for electrical faults in PV systems on homes or commercial buildings to start a fire, this is extremely rare.[82] Improving understanding of the PV-specific risks, safer system designs, and updated fire-related codes and standards will continue to reduce the risk of fire caused by PV systems.

PV systems on buildings can affect firefighters in two primary ways, 1) impact their methods of fighting the fire, and 2) pose safety hazard to the firefighters. One of the most important techniques that firefighters use to suppress fire is ventilation of a building's roof. This technique allows superheated toxic gases to quickly exit the building. By doing so, the firefighters gain easier and safer access to the building, Ventilation of the roof also makes the challenge of putting out the fire easier. However, the placement of rooftop PV panels may interfere with ventilating the roof by limiting access to desired venting locations.

New solar-specific building code requirements are working to minimize these concerns. Also, the

latest National Electric Code has added requirements that make it easier for first responders to safely and effectively turn off a PV system. Concern for firefighting a building with PV can be reduced with proper fire fighter training, system design, and installation. Numerous organizations have studied fire fighter safety related to PV. Many organizations have published valuable guides and training programs. Some notable examples are listed below.

- The International Association of Fire Fighters (IAFF) and International Renewable Energy Council (IREC) partnered to create an online training course that is far beyond the PowerPoint click-andview model. The self-paced online course, "Solar PV Safety for Fire Fighters," features rich video content and simulated environments so fire fighters can practice the knowledge they've learned. www.iaff.org/pvsafetytraining
- Photovoltaic Systems and the Fire Code: Office of NC Fire Marshal
- Fire Service Training, Underwriter's Laboratory
- Firefighter Safety and Response for Solar Power Systems, National Fire Protection Research Foundation
- Bridging the Gap: Fire Safety & Green Buildings, National Association of State Fire Marshalls
- Guidelines for Fire Safety Elements of Solar Photovoltaic Systems, Orange County Fire Chiefs Association
- Solar Photovoltaic Installation Guidelines, California Department of Forestry & Fire Protection, Office of the State Fire Marshall
- PV Safety & Firefighting, Matthew Paiss, Homepower Magazine
- PV Safety and Code Development: Matthew Paiss, Cooperative Research Network

Summary

The purpose of this paper is to address and alleviate concerns of public health and safety for utility-scale solar PV projects. Concerns of public health and safety were divided and discussed in the four following sections: (1) Toxicity, (2) Electromagnetic Fields, (3) Electric Shock and Arc Flash, and (4) Fire. In each of these sections, the negative health and safety impacts of utility-scale PV development were shown to be negligible, while the public health and safety benefits of installing these facilities are significant and far outweigh any negative impacts.

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Appendix K:

Hao & Michaud (2024) Property Value Study

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Solar Compass

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Assessing property value impacts near utility-scale solar in the Midwestern United States

Simeng Hao, Gilbert Michaud *

School of Environmental Sustainability, Loyola University Chicago, Chicago, IL, USA

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ABSTRACT

Utility-scale solar energy project proposals have been accelerating exponentially in the United States (U.S.) as the energy transition from fossil fuels to renewables continues to unfold. While the emissions and economic related benefits of deploying large-scale solar photovoltaics (PV) for electricity generation are well documented, relatively less is known about their impact on nearby property values. This paper investigates the location of utility-scale solar facilities in the U.S. Midwest, the average home value in each relevant zip code, and whether the presence of a utility-scale solar project affects nearby property values in any manner. Our study includes 70 utility-scale solar facilities built in the Midwest from 2009 to 2022 using data from the Lawrence Berkeley National Laboratory. Alongside housing value data from Zillow (i.e., Zestimate), we incorporate additional data, including solar project size in installed capacity, rurality, and state. Using the difference-in-differences method, our results indicate that utility-scale solar projects increase nearby property values by roughly 0.5–2.0 %. Moreover, our results show that smaller projects have more of a positive impact on nearby property values than projects that are 20 megawatts or larger. Ultimately, having a better understanding of how these larger-scale solar projects impact property values is essential for a variety of stakeholders – especially local officials and property owners – as they are increasingly faced with making decisions about whether to permit the construction of these facilities in their communities.

1. Introduction

Addressing escalating climate change concerns while promoting sustainable development is one of the foremost challenges of our time. While climate change is caused by several factors, such as inefficient energy infrastructure and increasing energy demand [57], specifically using fossil fuels to generate electricity is a key element that spurs greenhouse gas (GHG) emissions. According to the United Nations [52] and the United States [54] Energy Information Administration (EIA) (2021), burning fossil fuels currently accounts for 75 % (globally) and 73 % (in the U.S.) of GHG emissions, respectively. In response, governments around the world, including the current Biden Administration in the U.S., views the transition from fossil fuels to renewable energy as a top priority. In the U.S., the Bipartisan Infrastructure Law paves the way for renewable energy development by upgrading existing energy storage systems [34], which will be able to accommodate new renewable energy infrastructure such as wind and solar. Further, the Build Back Better plan incentivizes additional solar installations by increasing the investment tax credit (ITC) back to 30 % for qualifying technologies for the next 10 years [47]. While renewable energy only currently accounts for about 20 % of total U.S. electricity generation [59], the growth of large-scale renewable energy projects in recent years can increase this percentage significantly. For solar energy in particular, the installed capacity is expected to triple by 2034, amounting to nearly 700 additional gigawatts (GW), or enough to power >100 million homes [7].

Compared to biomass, hydropower, and wind, which are the three most abundant renewable energy generation sources in the U.S., solar energy accounts for only about 1.8 % of total electricity generation, yet it is also one of the fastest growing energy sources in the country [55], and also globally [46]. In the U.S., around 72 % of the total solar energy capacity is in the form of utility-scale solar photovoltaics (PV), ground mounted solar generation greater than 5 megawatts (MW), and utility-scale PV has been growing at a rate of 42 % annually since 2010 [10]. In fact, the U.S. installed 20.2 GW of solar PV capacity in 2022, which increases the cumulative total to well over 1000 GW of total installed capacity [48].

While the benefits and costs of traditional forms of distributed solar PV, such as rooftop systems, are well documented (e.g., [43,56]),

* Corresponding author.
E-mail address: gmichaud@luc.edu (G. Michaud).

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relatively less is known about the impacts of large, utility-scale projects, which are often built in rural or suburban communities. Compared to rooftop solar, utility-scale projects are usually located in strategic areas near substations and major transmission lines with more direct sun exposure. The first large-scale solar project can trace back to the 1990s, but the development of utility-scale solar has been growing at a historic rate only during the past decade or so [50]. The installed cost per watt of solar has also dropped about 85 % during the past decade due to technological innovations [58], which has further accelerated the energy transition. Utility-scale solar is being built all over the U.S., but a few regions are developing projects at a much faster pace than others. The South Atlantic region (e.g., the Carolinas, Georgia, etc.) has installed more utility-scale solar than any other region in the U.S., and California has the second highest utility-scale solar capacity by region [33]. Compared to these two regions, the Midwest, which has around 127 million acres of flat agricultural land, only started to see utility-scale solar development in the past 5–10 years [14]. While the Midwest offers less solar radiation compared to other regions like the Southwest, the agricultural land it has is great for solar development as most of the areas are flat with very few environmental constraints. Developers do not need as many environmental approvals for developing solar projects on agricultural land compared to developing on other areas, such as brownfields [2]. Moreover, several metropolitan areas in the Midwest, such as Chicago, Cincinnati, Columbus, and Minneapolis, have ambitious renewable energy goals for the near future [25], and Fortune 500 companies are also helping contribute to the demand. While most projects are still in the approval phase or currently under construction, it is expected that, just in the Midwest region, about 6.6 GW of utility-scale solar energy will be added to the grid by the end of 2024 [17].

While prior reports and papers have indicated that utility-scale solar can bring jobs and long-term economic benefits to rural communities [18,29,31,37], other studies have shown that these projects could possibly negatively impact local wildlife, food security, and nearby property values [51]. Among other concerns, the potential negative impacts to nearby home and land values are often brought up as a key factor for those parties opposing large solar energy projects. While there is a small, but growing, body of literature specifically investigating this topic, the results to date have been largely inconclusive. To briefly illustrate, property value impact studies done in both the United Kingdom (UK) and Massachusetts, where the solar projects under investigation were in more urban or suburban settings, suggested that there is a 1.7 % property value decline [19,30]. However, a different study looking at 956 unique solar projects across the U.S. concluded that there is no conclusive relationship between nearby solar projects and property values [1]. In addition, no prior studies have investigated these potential impacts across the entire Midwestern region of the U.S., an area that has millions of acres of flat agricultural land which can potentially be converted to utility-scale solar facilities, or partially converted via agrivoltaics.

Against this unique background, our paper first reviews the existing literature on the property value impacts of utility-scale solar. After a detailed discussion of our data and methods, we display the results of our various average property value models in the Midwestern states (see Fig. 1), and conclude with a final discussion that offers the novelty and significance of this study, including implications for future utility-scale solar development.

1.1. Prior literature

In general, property values are determined by several factors, including the size of a property, its orientation, number of bedrooms/bathrooms, air conditioning, distance to nearby cities, and many others. Among these, the features that increase property values are considered amenities, whereas disamenities do the opposite [13]. Amenities and disamenities not only include features within each property, but also features surrounding each property. There are hundreds of existing property value impact studies investigating if one specific feature outside of a property is amenity or disamenity; for example, according to several studies, open green space and rivers are amenities to nearby properties [13,23]. In most cases, proximity to nature is considered an amenity, while facilities that produce pollution are considered a disamenity. To illustrate, chemical plants, coal-fired power plants, and landfills all are examples of disamenities to property values [3,39,44].

While it is unclear whether utility-scale solar projects are considered

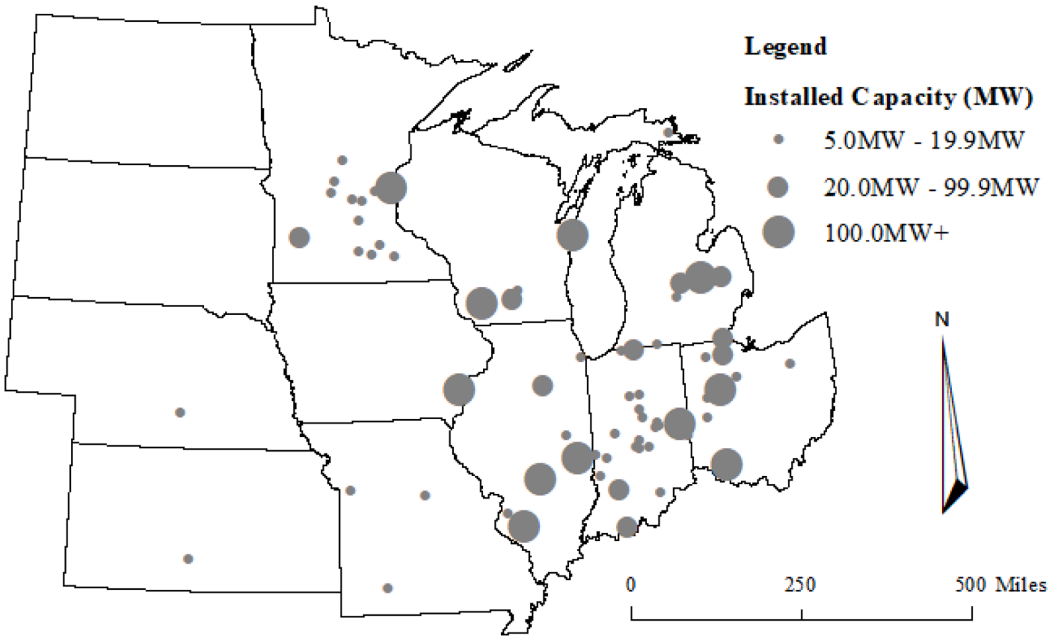

Fig. 1. Operational utility-scale solar facilities across the Midwest.

as an amenity or disamenity, public perceptions of these large solar projects can play an important role in determining property values. One study showed that about 70 % of Americans believed that utility-scale renewables were critical for the future of our energy supply, but the overall number of people who think that the energy transition and climate change should be a priority has been declining since 2019 [42]. The decline in overall awareness is largely due to the problem being relatively distant or remote from people's everyday lives, and, in recent years, appraisers have tended to associate utility-scale renewable installations with negative impacts to nearby properties [45]. Public perceptions, especially risk perceptions, can significantly affect housing values, and the effect can change when more assessments are completed [12].

1.1.1. Property value studies for utility-scale solar

While there is a small, but growing, body of literature investigating the property value impacts of utility-scale solar projects, the results have been largely inconclusive. Outside of the U.S., property value impact studies near large-scale solar projects done in South Korea and United Kingdom concluded that such solar projects could cause nearby property value declines of 5.0 % and 5.4 %, respectively [26,30]. In the U.S., studies done in the states of Massachusetts and Rhode Island used difference-in-differences (DID) methods and a hedonic pricing model that included environmental, neighborhood, and structural factors, and found that there is a 1.7 % housing value decline when there is a solar installation nearby [19,30]. To mitigate such impacts, a different study done in Portugal found that residents hoped to receive between $12.93–$56.64 per month for living close to utility-scale solar projects. This study investigated only three solar projects and created a questionnaire assuming that residents viewed utility-scale solar projects as disamenity [5]. Another study looking at 956 solar projects in the U.S. concluded that there is no real association between property values and nearby solar projects [1]. One of the most recent studies done by the Lawrence Berkeley National Laboratory showed that property values declined about 1 % depending on proximity to nearby solar projects, after investigating over 1.5 million housing transactions among 2000 solar projects in California, Connecticut, Massachusetts, Minnesota, North Carolina, and New Jersey [16]. Though there are no current studies, to the best of our knowledge, that show that having utility-scale solar nearby is a strong amenity per se, one study showed that 80 % of the residents in the U.S. support utility-scale solar projects in the country and specifically within their counties [10]. While some studies found negative associations between utility-scale solar and nearby property values, and some found no statistical significance, none of the prior studies have investigated the Midwest including all of the 12 states, an area that has millions of acres of flat agricultural land which potentially can be converted to utility-scale solar facilities.

In addition to the literature mentioned below and in Table 1, most large-scale solar projects have some kind of property value impact study done by the development companies or consultants prior to construction approval. There are two issues with these kinds of individual project studies. The first issue is that these studies are done only for their targeted areas, which are too specific and small to imply any regional trend. The second issue is that there can be a selection bias, as utility-scale solar development companies have a rational interest to avoid showing that their projects have a negative impact on these communities. Thus, only papers from academic institutions and studies that cover multiple projects from development companies were included in this section. In Table 1, in reverse chronological order, we show the key findings from five reputable studies that examine more than one solar project, all of which were done by academics or similar organizations.

1.1.2. Property value studies for other renewable energy sources

Though minimal research has been done regarding the property value impacts of utility-scale solar projects, similar questions have been well investigated for other renewable energy sources, such as residential solar PV and utility-scale wind. For residential solar, several studies have shown that buyers across various states, housing markets, and home types would consistently pay more for properties that have rooftop solar PV. In fact, in one paper, which examines 54 prior studies on renewable energy's impact on property values, rooftop solar is the only renewable source that creates consistent positive results [6].

On-shore wind energy is the most common renewable energy source in the U.S. [54], and it has a much longer history of development compared to utility-scale solar. Similar to utility-scale solar projects, most on-shore wind projects also tend to be in rural areas and occupy hundreds of acres of land [8]. A sufficient number of studies have been conducted regarding the property value impacts of being near wind projects, and a large majority of the results have showed no significance between property value and these wind projects (e.g., [21,60,61]). However, the property value impact of having wind turbines nearby can be different than utility-scale solar due to the difference in project acreage, as well as zoning regulations of wind energy development.

Though some existing research has indicated that large-scale solar projects might be a factor that causes nearby property value declines, some key research areas are still yet to be explored. To illustrate, most of the existing studies considered solar projects that are 1 MW or larger of installed capacity as "large-scale solar projects," but many projects larger than 1 MW can be set up as community solar projects instead of traditional utility-scale solar projects [36]. Distributed projects, including residential solar, community solar, and microgrid storage, are very different from utility-scale solar projects, and the property value

Table 1
Similar studies on the property value impacts of utility-scale solar.

Report/Paper Name (Year)	Author(s)	Publication/ Venue	Geography Investigated	Number of Projects Examined	Key Findings
Shedding Light on Large-Scale Solar Impacts: An Analysis of Property Values and Proximity to Photovoltaics Across Six U.S. States (2023)	Elmallah et al. [16]	*Energy Policy*	California, Connecticut, Massachusetts, Minnesota, North Carolina, and New Jersey	2000	Negative property value impact between −1.54 % to −0.82 %; depends on proximity to solar projects
Property Value Impact Study (2021)	Lines & McGarr[28]	Cohn Reznick, LLP	Michigan, Minnesota, Illinois, Indiana	6	No consistent negative impacts to nearby properties
Property Value Impact of Commercial-Scale Solar Energy in Massachusetts and Rhode Island (2020)	Gaur & Lang [19]	University of Rhode Island	Massachusetts and Rhode Island	284	1.7 % property value decline; property owners willing to pay $278 per year to avoid solar installation nearby
Solar Installations and Property Values (2019)	Marin[32]	University of Minnesota	Minnesota	32	Insignificant results on the relationship between solar installations and parcel values
An Exploration of Property-Value Impact Near Utility-Scale Solar Installations (2018)	Al-Hamoodah et al.[1]	University of Texas at Austin	Surveyed all 50 states in the U.S.	956	Mixed survey response, results showed that proximity to solar installation has no significant impact on home values

impacts of these kinds of solar projects can be specifically different due to ownership structure and related factors. Our study addresses the question of property value impacts of utility-scale solar projects by specifically only including projects that are 5 MW in installed capacity or larger (instead of 1 MW). Moreover, we explore the impact of *all* utility-scale solar projects in the Midwest, and no property value impact study of utility-scale solar projects has included all 12 states in this region before. Taken as a whole, our study fills an important research gap by more comprehensively investigating the relationship between property value and utility-scale solar projects in the Midwest, a region that experienced exponential growth in utility-scale solar project proposals and installations in the past handful of years.

2. Material and methods

Utility-scale solar project data and housing value data are two critical datasets that were utilized in this study. The utility-scale solar project data was gathered from the Utility-Scale Solar 2022 Edition Data File from the Lawrence Berkeley National Laboratory [4], a center that is part of the U.S. Department of Energy. The data file includes 1147 individual completed utility-scale solar projects that all are 5 MW in installed capacity or larger, and the projects come from 44 different states. For each individual project, the data file includes key information including installed capacity (in MW), longitude and latitude of the project (and, thus, zip code), the state which the project is located in, and the commercial operation date of the project. According to the U.S. Census Bureau [53], the Midwestern states include (in alphabetical order): Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; for this study, only projects from those Midwestern states were selected. With 10 Midwestern states selected (other than North Dakota and South Dakota, which did not have any utility-scale solar projects in the data file), there were 83 utility-scale solar projects built from January 2009 to January 2022. The 83 individual projects included those that were under the same name but have different construction dates, and projects that had a different name but were located in the same longitude and latitude. It was important to exclude those projects because they were not unique to one specific area at a certain time period. After excluding those repetitive projects, 70 total projects were identified, and, thus, included in this study. The location of each project is shown as a gray circle in Fig. 1, and the difference in the size of the circle represents the amount of installed capacity. Based on the map, the number of projects by state was unevenly distributed, and there were more projects that are smaller than 20 MW in installed capacity than ones which were larger. Moreover, the timeline of newly operational projects was also unevenly distributed. As Fig. 2 shows, over 20 projects started operation in 2021, and about two-thirds of the 70 projects were built in the last five years.

Average housing value (AHV) data was gathered from Zestimate, a home value estimator database by Zillow. While collecting real transaction data would generate more accurate results, there were thousands of transactions happening each year near each utility-scale solar project site, which would make it extremely time consuming and costly to collect. Therefore, Zestimate was the best available dataset, and included information on home characteristics, listing price, prior sales, and market trends. The Zestimate dataset included AHV in almost any given month from January 2000 to June 2022 in every zip code. Zestimate differentiated property types, and because 3-bedroom houses were the most popular property types [20], this study only included the AHV of 3-bedroom houses. Additionally, since the number of bedrooms could affect housing value [22], only investigating 3-bedroom houses kept the dataset more specific and uniform. Finally, to merge the project location data and housing value data, the project location data, which was in longitude and latitude, was changed to the form of zip code.

As our study tracked AHV changes for each project over a long period of time, it was critical to account for inflation and extreme economic events such as COVID-19 and the 2008 housing crisis. For instance, it would be unfair to compare the AHV in March 2015 at zip code 55,056 to the AHV in April 2019 at the same zip code without including the effect of inflation and housing market fluctuation. Thus, the Case Schiller (CS) Index was included in this study to normalize the AHV. The CS Index is measured using data on repeated sales of single family homes over time, and this index had housing value by month from January 2000 [11] The CS Index has been used in several prior studies to better understand property values and housing market trends (e.g., [9,15,41]).

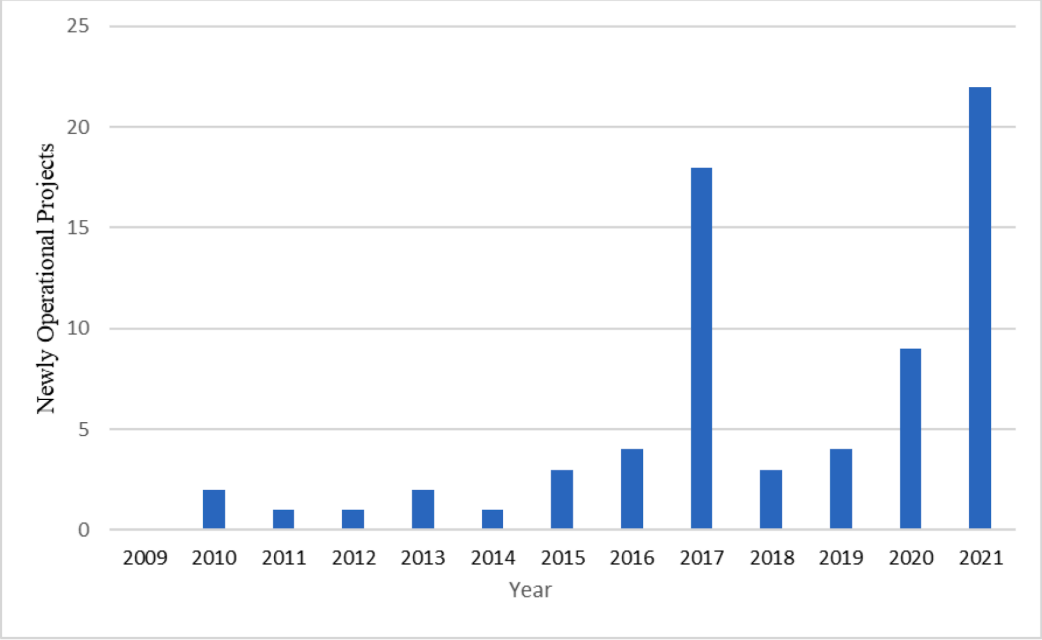

Fig. 2. Installation timeline of utility-scale solar projects in the Midwest.

As demonstrated in Fig. 3, in general, while AHV increased over time, it decreased from 2009 to 2012 following the 2008 economic crisis. While the CS adjusted value seemed to have a downward trend, it remained mostly constant from 2013 to 2019, which excluded the 2008 economic crisis and COVID-19. Thus, part of the study included CS adjusted AHV from 2013 to 2019, which is explained in later sections of this paper.

Rurality may be another significant factor that could affect housing value, and, according to the U.S. Department of Agriculture (USDA), each zip code in the U.S. has a rating between 1 and 10, with 1 being metropolitan and 10 being rural areas [24]. The rating classifications were primarily based on the size and distance of commuting flows, and to simplify the ratings and for ease of analysis, this study categorized ratings between 1 and 5 as metro, and 6–10 as non-metro, or "rural." To transfer this rating into binary variables, all metro areas were listed as "0," and all non-metro areas were listed as "1." The rurality ratings of each project are listed in Appendix A.

With project data, housing data, CS data, and rurality data all being collected, our next step was to arrange them into one spreadsheet. For each utility-scale solar project, monthly AHV was tracked from March 2009 to June 2022, so given 160 months, 70 unique utility-scale solar projects, and the treatment and control groups (see Section 3.1), 22,400 unique data entries were collected. However, because Zestimate missed some AHV data for some zip codes, only 20,815 data entries had actual AHV values. For the CS-adjusted data, since only the AHV between January 2013 to December 2019 were included (excluding the COVID-19 years and 2008 housing market recovery years), only 35 projects out of 70 projects were counted, which left 5778 usable zip code-year combinations with actual AHV values.

2.1. Treatment and control group definitions

To examine the relationship between utility-scale solar projects and nearby property values, we set up each solar project to have a treatment group and a control group. The treatment group for each project included the zip code which has a utility-scale solar project, and the control group for that project included a randomly selected zip code which geographically touched the treatment zip code. The control zip code did not have a utility-scale solar project and was in the same state as the treatment zip code. In binary variable terms, the treatment zip code was marked as "1," and the control zip code was marked as "0."

With the treatment group and control group established, the next group of variables were pre- and post-operation. Based on the hypothesis, it was expected that the change in AHV in the treatment group after the project started operating would be different than the change in AHV before the project operational date. For example, if the operational date of a project was March 2012, all months from March 2009 to February 2012 would be considered as pre-operation, and, in binary variable terms, it was marked as "0." Any month from March 2012 to June 2022 for that project would be considered as post-operation, and, in binary variable terms, it was marked as "1." The binary variable was labeled as "Post." For the control group, Post would be 1 when the project in the treatment group started operation. Though "Post" would be a required variable in a standard DID method, "Post" was not included as an individual variable because it was absorbed by the "Year" fixed effect as they are similar chronological variables.

Under the hypothesis that there was an association between housing value and nearby utility-scale solar projects, the AHV in the treatment group after operation would be statistically significantly different compared to other groups, including the control group after operation or treatment group before operation. Therefore, the statistical significance of AHV differences in the treatment group after operation indicated if utility-scale solar projects had some impact on nearby property value. Since the new variable, treatment group after operation, was based on the treatment group and post-operation variables, the new variable is shown as "Treated*Post" in the formula. The variable "Treated*Post" is also a binary variable, treatment group after operation is 1, and 0 otherwise.

"Treated" and "Treated*Post" were the required variables to determine the association between housing value and nearby utility-scale solar projects. However, other factors such as rurality, state, project size, and operational date might also affect property values, and adding those variables would increase the accuracy of the results. State was included as a categorical variable, and each data entry had one state which the project located in Next, project size in installed capacity was organized into a binary form, in which 1 indicates projects that were smaller than 20 MW, and 0 otherwise. There are many definitions of

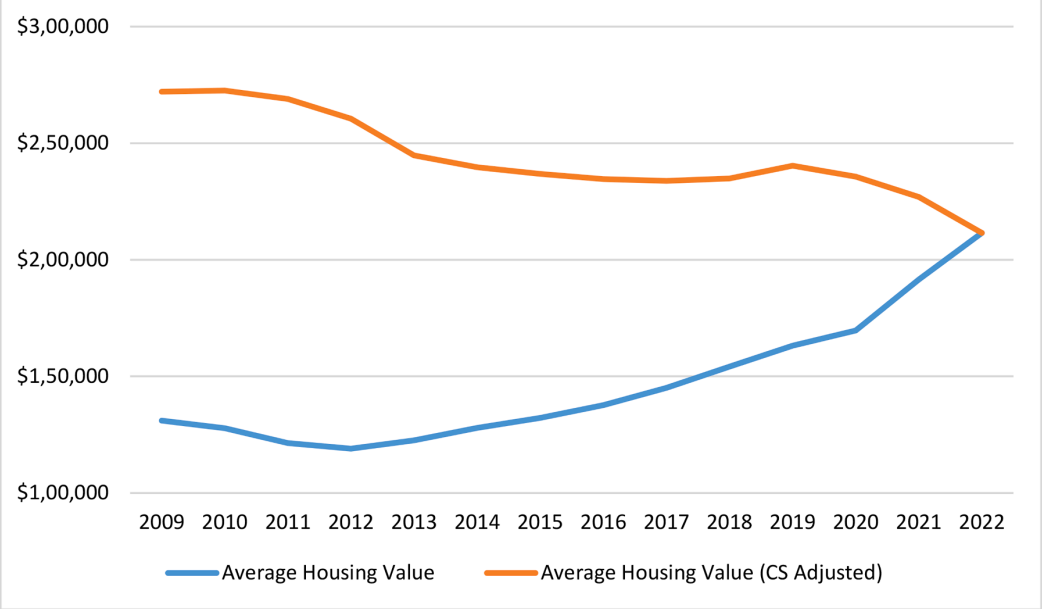

Fig. 3. Housing value trend timeline (normal and case schiller adjusted).

what the minimum size of a utility-scale solar project is, and the most popular figures are 5 MW and 20 MW [38]. So then, our size variable not only showed results from two definitions, but also determined if project size was a statistically significant factor for nearby property values. We also included year as a categorical variable, which could account for economic recessions, housing market fluctuations, and inflation, and this variable was only applicable for non-CS adjusted values as CS accounted for some of those factors. Finally, county and zip code were included as categorical variables, which could determine the differences of AHV between different areas (Table 2).

2.2. Equations and difference-in-differences method

After obtaining the data and developing these variables, our next step was to use a statistical method to analyze the data entries and determine the association. As shown in Appendix B, because the data was not perfectly randomized on an individual level, and there were many repeated cross-sectional data, it was best to use the DID method. While the property value study done in Rhode Island and Massachusetts [19] also utilized a DID analysis, the dataset and variables were rather different. Due to the amount of data entries, and the variety of variables that were available in this study, three different models were created to test the hypothesis. All three models included Treated, Treated*Post, Rurality, Size, Year, Constant (C), yet State, County, and Zip Code were not used in all models. All three models were run twice, once with normal unadjusted AHV, and once with CS-adjusted AHV. All three models were tested via Stata using confidence intervals of 90 %, 95 %, and 99 %, which is standard for studies of this variety.

All three models had the exact same variables other than the fixed effects. For the first model, the fixed effect was "State," for the second model it was "County," and for the third model it was "Zip Code." The change in fixed effects can help determine the consistency of the overall results. By adding the richness of the variables from State to Zip Code, the results in Model 3 would have the highest adjusted R^2 value, which would give the results more validity. With the unadjusted AHV, each model contained 20,815 data entries and accounted for all 70 utility-scale solar projects in our sample. For the CS-adjusted AHV, each model included 35 out of 70 total projects, which represented 5778 unique data entries. Because each model was run twice, there were six results. The equation of property (location x) sale price (P) at time (t) is:

Model 1: State Model

$$P_{xt} = \beta_1 * Treated_{xt} + \beta_2 * (Treated_{xt} * Post_{xt}) + \beta_3 * Rurality_{xt} + \beta_4 * Size_{xt} + \beta_5 * Year_{xt} + \delta_{st} + C + E$$

Model 2: County Model

$$P_{xt} = \beta_1 * Treated_{xt} + \beta_2 * (Treated_{xt} * Post_{xt}) + \beta_3 * Rurality_{xt} + \beta_4 * Size_{xt} + \beta_5 * Year_{xt} + \delta_{ct} + C + E$$

Model 3: Zip Code Model

Table 2
Definitions of variables included in this study.

Variable	Definition
P_{xt}	Housing pricing at zip code x at time t
$Treated_{xt}$	Binary variable, 1 for the treatment group, 0 for the control group
$Post_{xt}$	Binary variable, 1 for after operation, 0 for before operation
$Rurality_{xt}$	Binary variable, 1 for non-metro zip codes, 0 for metro zip codes
$Size_{xt}$	Binary variable, 1 for projects with an installed capacity between 5 and 20 MW, 0 for projects with an installed capacity larger than 20 MW
$Year_{xt}$	Categorical variable, each year is in its own category
δ_{st}	State fixed effect
δ_{ct}	County fixed effect
δ_{xt}	Zip code fixed effect
C	Constant
E	Standard Error

$$P_{xt} = \beta_1 * Treated_{xt} + \beta_2 * (Treated_{xt} * Post_{xt}) + \beta_3 * Rurality_{xt} + \beta_4 * Size_{xt} + \beta_5 * Year_{xt} + \delta_{xt} + C + E$$

Again, the fixed effects are different between the three models. There are 12 states in the state variable, 60 unique counties in the county variable, and 70 unique zip codes in the zip code variable. The increase in the richness of the fixed effects increased the accuracy of the results, and the consistency of the results were shown when comparing all three models.

3. Results

3.1. AHV comparison with different variables

Comparing the AHV of each group was the simplest and the most direct way to visualize the differences. Table 3 uses the unadjusted AHV of the 70 projects in the Midwest from January 2009 to June 2022, and it included most of the variants used for all three models under the "Variant" column. "Mean Housing Price" presented the statistical average of the AHV of each variant, and all of the mean housing prices were compared to the overall mean housing price. The table also includes the minimum, maximum, and standard deviation of each mean housing price.

As Table 3 indicates, the overall mean was $145,317, and the treatment group and control group were relatively close to this overall mean. Other than the treatment group and the control group, all other variants had relatively significant differences when compared to the overall mean. AHV near projects that were between 5 and 20 MW in installed capacity were higher than the ones that were not. For projects that were located in metro areas, the AHV was $4694 greater than the overall mean, which indicated that the AHV in metro areas was higher than the AHV in rural areas.

The AHV of post-operation was also compared to the overall mean. Since housing prices traditionally increase over time, it was expected that housing price after operation, such as in 2020, would be higher than before operation, such as in 2013. Table 3 shows that "Overall Post," which included all housing prices after operation, was $23,216 higher than the overall mean. Similarly, "Control Post" and "Treated Post" both had higher AHV than the overall mean.

Since this study also involved models which included CS-adjusted housing values, Fig. 4, an AHV comparison graph, demonstrates the

Table 3
Summary statistics.

Variant	Mean Housing Price	Minimum	Maximum	Standard Deviation	Comparison to Overall Mean
Treatment Group	$145,327	$32,137	$504,682	$56,648	10$
Control Group	$145,307	$51,743	$426,922	$55,268	−10$
5 MW–20 MW Projects	$150,011	$32,137	$504,682	$57,701	$4694
>20 MW Projects	$134,059	$63,290	$408,221	$49,735	-$11,258
Metro Projects	$150,001	$32,137	$504,682	$58,650	$4684
Non-Metro Projects	$127,236	$63,290	$320,201	$39,043	-$18,081
Control Post	$170,511	$58,540	$426,922	$63,237	$25,194
Treated Post	$166,558	$35,051	$504,682	$63,051	$21,241
Overall Post	$168,533	$35,051	$504,682	$63,171	$23,216
Overall Mean	$145,317	$32,137	$504,682	$55,949	$0

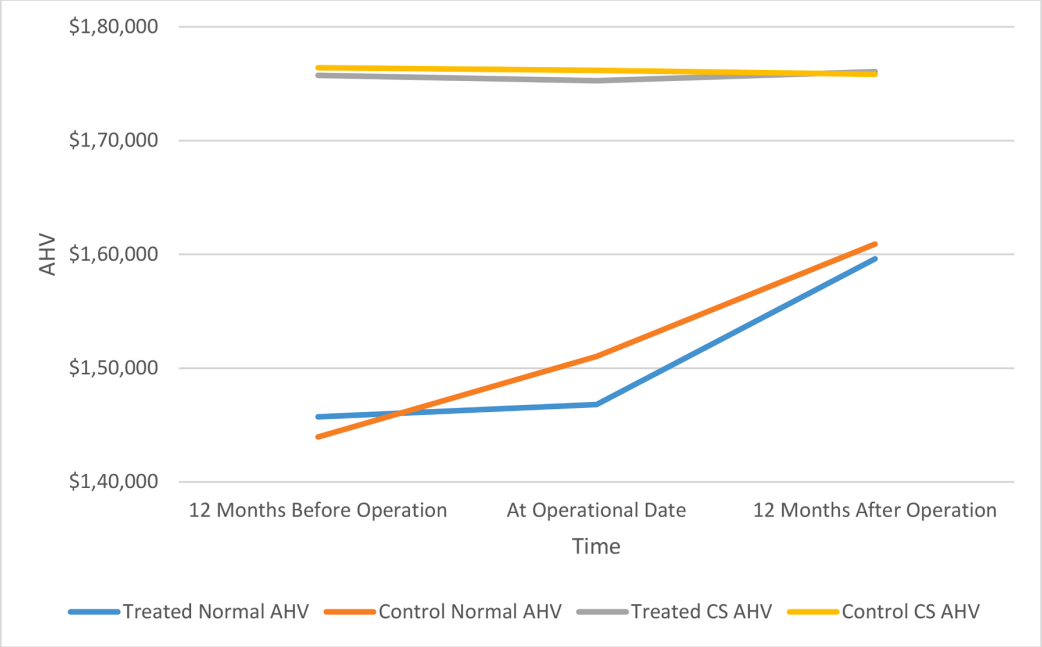

Fig. 4. AHV comparison graph.

difference between CS-adjusted housing value and normal housing value. For the unadjusted AHV, both treated and control groups saw an increase in AHV, which was expected because AHV increases over time. For the CS-adjusted AHV, both control and treated groups have similar AHV values throughout. Overall, the CS-adjusted AHV had much higher values than the unadjusted numbers because the CS-adjusted AHV were adjusted to December 2019 AHV. Based on the graph, there was not a clear association between utility-scale solar projects and nearby property value. Thus, our DID models offer more detailed results.

3.2. Difference-in-differences results

Below, Tables 4 and 5 include the three DID models, and the statistical significance is marked with an asterisk (*) sign after the coefficient. The different number of asterisks represent different statistical significance levels. For the "State," "County," and "Zip Code" fixed effects, the coefficients were significant at 99 % confidence level, and because the fixed effects were different in the three models, the coefficients of those fixed effects were not listed in Tables 4 and 5.

Each model in Table 5 included 20,815 total observations including all 70 projects from March 2009 to June 2022, and in Table 4, there were

Table 4
DID property value impact CS adjusted AHV analysis.

Variables/Models	Model 1: State	Model 2: County	Model 3: Zip Code
Treated VS Controlled (β_1)	−1458	−3338***	Unidentified
Property Value Impact (β_2)	−662	2640**	700***
Rurality (β_3)	−25,563***	−22,166***	Unidentified
Project Between 5–20 MW Installed Capacity (β_4)	13,620***	50,206***	23,200***
Constant (C)	177,335***	158,793***	143,235***
Numbers of Observations (n)	5778	5778	5778
Standard Error (E)	12,472	2670	2443
R^2	0.5642	0.8209	0.9897
Adjusted R^2	0.5629	0.8197	0.9895

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table 5
DID property value impact CS normal AHV analysis.

Variables/Models	Model 1: State	Model 2: County	Model 3: Zip Code
Treated VS Controlled (β_1)	−2921***	−2976***	Unidentified
Property Value Impact (β_2)	2004**	1310**	3199***
Rurality (β_3)	−21,910***	−10,425***	Unidentified
Project Between 5–20 MW Installed Capacity (β_4)	19,492***	779	8357***
Constant (C)	94,369***	185,827***	143,235***
Numbers of Observation (n)	20,815	20,815	20,815
Standard Error (E)	9985	21,281	18,388
R^2	0.5880	0.8158	0.9483
Adjusted R^2	0.5875	0.8151	0.9479

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

5778 observations for each model because only 35 projects from January 2013 to December 2019 were included. The R^2 indicates how much variance is explained in the model. Model 3 for both normal AHV and CS-adjusted AHV explained over 94 % of the overall AHV outcome, and Model 3 is generally considered the most robust and reliable model. The high adjusted R^2 was due to the large number of unique zip codes in Model 3. Model 2, the County model, explained over 80 % of the overall AHV outcome, and Model 1, the State model, explained over 55 % of the overall AHV outcome.

Despite all three models not having the same fixed effects, the first five variables existed in all three models. β_1 represented the AHV difference between treatment group and control group before any solar project was introduced. A negative coefficient indicated that the treatment zip code had an overall lower AHV compared to the control zip code before any utility-scale solar installation. Since the "Treated" variable was measured on a zip code level, Model 3 counted the zip code variable twice, as it had a zip code variable as a fixed effect. Since DID cannot identify the zip code-specific effect in a model with zip code fixed effect, β_1 in Model 3 was unidentified. Among Model 1 and Model 2, three out of the four β_1 showed statistical significance. The results from Model 1 and Model 2 indicated that before utility-scale solar projects

were developed, the treatment areas had relatively lower AHV compared to the controlled areas. This difference in AHV can be as large as $3338, depending on the models.

The coefficient β_2 demonstrated the impact of utility-scale solar projects on nearby property values by comparing the treatment group after operation to other variable combinations. Other than the normal AHV Model 1, all other models in both normal AHV and CS-adjusted AHV showed positive statistical associations. Based on Tables 4 and 5, there was a positive association between utility-scale solar projects and nearby property value, from $700 to $3199, depending on the model. This coefficient equates to a 0.5–2.0 % property value *increase* with utility-scale solar nearby, and the consistency between results in all models further strengthens this outcome.

Rurality was yet another factor that could potentially affect property values, and the coefficient of β_3 indicated this relationship. A negative coefficient showed that properties in non-metro areas had lower AHV than properties in metro areas. The coefficients of rurality in Model 3 were unidentified because the rurality variable, which was measured at the zip code level, was not independent to the zip code fixed effect. Results from Model 1 and Model 2 indicated that properties in rural areas had significantly lower AHV than properties in metro areas. Based on the coefficient, rurality was the most impactful variable other than the "Year" variable. β_4 differentiated the AHV between properties that were near smaller projects (5–20 MW of installed capacity) and properties that were near larger utility-scale solar projects (greater than 20 MW of installed capacity). Five out of the six results here showed statistical significance. Thus, our results indicate that properties near smaller projects had a higher AHV than properties near larger projects.

4. Discussion

Overall, our work aimed to better discern if large solar projects had any sort of impact on property values as part of broader discussion of how and where to build such projects. Among other factors, distance to interconnection points to the grid, solar radiation, and local zoning ordinances are some of the reasons that solar developers choose certain geographies to build a project. As our models suggested, there was a negative statistical association between the treatment group and the control group, and these results indicate that the sites that developers selected had lower property values (i.e., costs) than the areas they did not select. However, the magnitude of the effect was relatively minimal, as the treatment group only had between 2.0–3.1 % lower AHV than the control group. While stakeholders such as local officials and landowners would simply think that developers would choose a site due to the low cost of the land, there are several additional factors that can influence the site selection process [37,49]. Assuming solar resources being equal, lower AHV in most cases is equal to lower land value, and it would be logical that developers would choose areas that had slightly cheaper land to develop projects compared to the surrounding areas.

Though the magnitude of effect of utility-scale solar and property value impacts were somewhat small, the associations were still statistically significant. Five out of our six models showed positive associations at the 95 % confidence level or higher, with the coefficient between $700 to $3199. The only model that did not show any statistical significance was the State model, which had the lowest adjusted R^2 value among all six. These coefficient values translate to a 0.5–2.0 % increase in AHV when there is a utility-scale solar project nearby. Both normal AHV and CS-adjusted AHV indicated similar results, further strengthening our finding of this directional relationship between property values and utility-scale solar projects. The positive correlation between utility-scale solar projects and nearby property values could be due to the new tax revenues, which are often used to support local schools and other public services, as well as the local employment opportunities that utility-scale solar projects can provide. Many utility-scale solar developers also engage with local communities by hosting landowner meetings and supporting other events such as county fairs, and those benefits to the local communities could perhaps increase the AHV as well. It is also worth noting that our results were different from many prior studies, as several indicated that there would be slight negative association between utility-scale solar projects and nearby property values.

It was expected that rural property values would be less than metro property values, which was shown in both Models 1 and 2. Rurality is one of the most impactful factors for property value impacts, and our coefficient were between -$10,425 to -$25,563. Moreover, AHV near projects that were between 5 and 20 MW of installed capacity were higher than the AHV of those near larger projects. Smaller projects, especially projects that were around 5 MW in installed capacity, could be easily hidden with vegetative buffers, and stakeholders are less likely to physically see these projects [10].

While the statistical findings of our study were different from several prior papers, most of the studies showed that the magnitude of impact which utility-scale solar projects had on nearby property values were relatively minimal. Both the Massachusetts and Rhode Island study and the Lawrence Berkeley National Laboratory study indicated that the negative impact was <2 %. Those two studies also indicated that other factors, such as number of bedrooms and location of the property, were much more impactful than the influence of utility-scale solar projects. Similarly, in this study, other factors such as rurality and state affected property values at a much higher magnitude than having a utility-scale solar project nearby. Put another way, many prior studies showed that utility-scale solar projects are not the main driving factor for the change or differences in property values, and our study showed the same.

A novel contribution of our study is that no prior study has investigated over 70 projects in one geographical region within the U.S. (i.e., the Midwest). Instead, most of the property value impact studies target specific projects and specific audiences, such as local or state government officials. However, as the results of zip code, county, states, and other variables showed in this study, the impact of each project can be drastically different from one another. Most of the prior property value studies, which only investigate one or two solar projects, cannot represent the broader impact of all utility-scale solar projects. This is further important as project proposals seemingly emerge weekly in this region.

Understanding the property value impacts of utility-scale solar projects in the Midwest not only helps stakeholders such as landowners and local officials better comprehend the overall costs and benefits of utility-scale solar projects, but it also generates ideas for potential policy change in the future, should they be achievable in complex regulatory environments [35]. For instance, many counties in the Midwest still require utility-scale solar projects to be at least 500 feet away from the nearest property (i.e., the setback rule), and this has been one of the toughest obstacles for the development process [27]. As our study showed, the effect of utility-scale solar projects on nearby property values was actually positive in both rural and metro areas, and, thus, local officials could perhaps relax the regulations on how far these projects need to be away from nearest residence. In addition, as most studies have found that the magnitude of impact which utility-scale solar projects had on nearby property values were relatively small, and in our case were positive, local and state officials could create pathways for projects to get approved easier (e.g., with less impact studies required) in order to meet Renewable Portfolio Standards and other renewable energy and decarbonization goals as part of a broader energy roadmapping effort [40].

There are some limitations to our study, both in the data collection process and methods, which are worth noting. For instance, using data from Zestimate and categorizing projects by zip code may be less accurate than using real transaction data and sight lines or radii for geographic bounds. Nevertheless, the benefit of using Zestimate in this study was to ensure that there would be a value for every zip code at every month. Further, using zip codes for housing locations is less accurate than coordinates, and not every solar project is located directly in

the center of each zip code area, impacting the accuracy. Finally, using binary variables in several places, while easier to interpret, may not always be detailed enough, such as in how the property value impact of a 200 MW solar project may be very different than a project that is 20 MW. Similarly, many suburban areas under the binary framework were considered as "Metro," and less than one-third-of all projects were considered as "non-Metro."

Finally, a few ideas for future research emerged from this study. First, instead of using zip code as a unit, future studies could include a parameter for each project via GIS (such as miles or kilometers away), ensuring that a project is always at the center of the parameter, therefore increasing the accuracy of the results. Further, to determine the property value impacts of utility-scale solar projects across the entire U.S., studies could randomly select projects from each geographical region to generate results that are applicable to all projects. Moreover, while we have speculated that one of the reasons that we are seeing an increase in property values is from the new economic activity in these areas via tax revenues that are being fed into communities, future studies should attempt to move beyond correlations and attempt to pinpoint the exact driver(s) of "why" property values are changing.

CRediT authorship contribution statement

Simeng Hao: Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Gilbert Michaud:** Writing – review & editing, Writing – original draft, Validation, Supervision, Software, Resources, Project administration, Investigation, Conceptualization.

Declaration of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Utility-Scale Solar Projects in the Midwest with Key Data

Project	Operation Date	State	Solar Capacity (MW-DC)	Zip Code	Non-Metro (Rurality)
Riverstart Solar Park	12/31/2021	IN	268.00	47,358	1
Hillcrest Solar	7/30/2021	OH	260.00	45,154	0
Prairie Wolf Solar	11/30/2021	IL	255.00	61,938	0
Two Creeks Solar	11/30/2020	WI	213.00	54,241	0
Hardin Solar Energy (Hardin I)	2/28/2021	OH	199.30	45,812	0
Badger Hollow I	11/30/2021	WI	191.60	53,569	1
Assembly Solar II	12/31/2021	MI	161.00	48,449	0
North Star Solar Project	10/20/2016	MN	138.00	55,056	0
Dressor Plains Solar	9/30/2021	IL	135.40	62,080	1
Prairie State Solar Project	7/30/2021	IL	132.30	62,237	1
Wapello Solar	3/31/2021	IA	127.50	52,653	1
Marshall Solar Project	1/9/2017	MN	93.16	56,258	0
Assembly Solar I	12/31/2020	MI	72.30	48,817	0
Troy Solar	4/30/2021	IN	64.70	47,588	1
Lapeer Solar Project I (Demille Array)	5/1/2017	MI	34.57	48,446	0
Temperance Solar	12/31/2020	MI	29.60	48,133	0
Bingham Solar	12/31/2020	MI	29.40	48,879	0
Bowling Green Solar	1/19/2017	OH	28.70	43,402	0
St. Joseph Solar	3/31/2021	IN	25.40	46,530	0
NSA Crane Solar Project	2/27/2017	IN	24.30	47,553	1
O'Brien Solar Fields	5/31/2021	WI	24.13	53,711	0
Grand Ridge Solar Plant	7/27/2012	IL	22.76	61,364	0
Delta Solar Power II (DSP-II $A + B$, Delta Solar Power Project)	7/30/2018	MI	19.40	48,837	0
Logansport Solar	9/30/2021	IN	19.30	46,947	0
Electric City Solar	12/31/2020	MI	18.90	49,091	0
Wapakoneta-Pratt	11/30/2021	OH	17.30	45,895	0
Aurora Waseca Solar	6/30/2017	MN	15.92	56,093	1
Aurora Paynesville Solar	6/30/2017	MN	15.24	56,362	1
Aurora Albany Solar	6/30/2017	MN	15.24	56,307	0
Truman Solar	6/30/2021	MO	14.00	65,201	0
Indy Solar I	12/16/2013	IN	13.90	46,259	0
AES Belleville Solar LLC	9/30/2021	IL	13.30	62,220	0
IMPA Crawfordsville 5 Solar Park	9/30/2020	IN	13.24	47,933	0
DG AMP Solar Piqua Manier	7/30/2019	OH	13.20	45,356	0
IND Airport Solar Farm Phase 2 (INDY II + III)	9/30/2015	IN	13.20	46,241	0
Camp Ripley Solar	1/31/2017	MN	13.10	56,345	1
IMPA Peru 2 Solar Park	4/30/2021	IN	12.60	46,970	0
Northern Cardinal Solar SCS IL 1, LLC (Solar Farm 2.0)	2/28/2021	IL	12.30	61,822	0
Aurora West Waconia Solar	6/30/2017	MN	12.25	55,397	0
PSEG Wyandot Solar Facility	3/15/2010	OH	12.02	43,351	1
Indy Solar III	12/16/2013	IN	11.90	46,221	0
IMPA Richmond 5 Solar Park	6/30/2021	IN	11.90	47,374	0
Dane County Airport Solar	12/31/2020	WI	11.40	53,704	0
IMPA Anderson 3 Solar Project	12/31/2021	IN	11.34	46,013	0
Indianapolis Motor Speedway (IMS) Solar Farm	7/31/2014	IN	11.20	46,222	0
Nixa Solar Farm	11/14/2017	MO	11.09	65,714	0
Aurora Lake Pulaski Solar	6/30/2017	MN	10.92	55,313	0

(continued on next page)

(*continued*)

Project	Operation Date	State	Solar Capacity (MW-DC)	Zip Code	Non-Metro (Rurality)
Independence II Solar Farm (IPL2, Bundschu)	6/30/2018	MO	10.87	64,056	0
IMPA Anderson 2 Solar Project	12/30/2017	IN	10.20	46,011	0
Exelon City Solar (West Pullman Industrial Redevelopment Area)	7/1/2010	IL	10.00	60,643	0
Aurora Dodge Center Solar	6/30/2017	MN	9.90	55,927	0
BNB Napoleon Solar Phase 1	12/23/2011	OH	9.79	43,545	1
IMPA Scottsburg Solar Park	10/31/2020	IN	9.75	47,170	0
Aurora Annandale Solar	6/30/2017	MN	9.12	55,302	0
Athens MN CONX (Ventyx: Connexus Energy (Athens))	12/31/2018	MN	8.84	55,040	0
DG AMP Wadsworth 1048	12/31/2019	OH	8.60	44,281	0
Aurora Eastwood Solar	6/30/2017	MN	8.23	56,001	0
Aurora West Faribault Solar	6/30/2017	MN	7.89	55,021	0
City of Pratt Solar (Pratt Solar Farm)	3/31/2019	KS	7.67	67,124	1
Pickford Solar	2/28/2021	MI	7.60	49,774	0
Connexus Solar Stanford 1STF (Sunflower)	5/31/2021	MN	7.30	55,070	0
Kearney NPPD Solar Project	12/11/2017	NE	7.25	68,847	0
Kokomo Solar Park (Kokomo Solar 1)	12/29/2016	IN	7.15	46,902	0
McDonald Solar Farm	12/26/2015	IN	7.14	47,885	0
Sullivan Solar	9/1/2016	IN	7.00	47,882	1
Pastime Farm	12/26/2015	IN	6.93	47,834	0
Olive Solar Power Project	9/1/2016	IN	6.47	46,552	0
Tipton Solar Park	7/30/2019	IN	6.30	46,072	1
Middleton Municipal Airport Solar (Morey Field)	7/30/2020	WI	6.30	53,562	0
IMPA Anderson 1 Solar Project	1/23/2017	IN	6.20	46,001	0

Appendix B. Utility-Scale Solar Overview by State, Project Size, and Rurality

State/Project Size & Rurality	100 MW+	20 MW–100 MW	5 MW–20 MW	*Total*	Non-Metro	Metro
Iowa	1	0	0	*1*	1	0
Illinois	3	1	3	*7*	2	5
Indiana	1	3	18	*22*	5	17
Kansas	0	0	1	*1*	1	0
Michigan	1	4	3	*8*	0	8
Minnesota	1	1	12	*14*	3	11
Missouri	0	0	3	*3*	0	3
Nebraska	0	0	1	*1*	0	1
Ohio	2	1	5	*8*	2	6
Wisconsin	2	1	2	*5*	1	4
Total	**11**	**11**	**48**	***70***	**15**	**55**

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Appendix L:

NRCS Practice Code 327

Native Prairie Establishment
Conservation Cover – NRCS Practice code 327

Many species of warm season grasses (big bluestem, little bluestem, indiangrass, etc.) and cool season grasses (Western wheat grass, blue joint grass, Canada and Virginia wild rye, etc.) are native to the state of Illinois. Most of their growth occurs during summer and germination of the seeds occurs when surface soil temperatures reach over 65 degrees Fahrenheit. They exhibit a very robust growth pattern and will reach height of 3 to 7 feet. Height combined with robust growth creates dense stands suited to winter and escape cover. Many songbirds, pheasant, turkey and rabbits will utilize these grasses as foraging and bedding areas. Native grasses fit virtually any planting situation. Once established these grasses are very persistent and compete well with unwanted vegetation. Native warm season grasses will take three to five years to become fully established.

Native Forbs (Wildflowers) and Legumes are an important component of a Warm Season Grass Planting. Forbs are responsible for the large variety of color within the prairie. Forbs and Legumes support large communities of insects, while returning nutrients back into the soil. They add structure to the stand and attract insects. Upland birds feed entirely on insects in the first part of their lives. Forbs can provide bugging opportunities for these species. Native forbs in the mix may also add to the success of the stand by "taking up space" that might otherwise be filled by noxious broadleaved weeds.

Establishing Native Warm Season Grasses
Establishment of native warm-season grasses can be discouraging especially if you are accustomed to working with cool-season species. The primary difference between the two types is in seedling vigor. Warm-season grasses emerge in late spring and most grow quite slowly the first season. Growth is usually very rapid in the second growing season, but may take three years. Many first-year stands are prematurely judged a failure by inexperienced persons. Under the right conditions, native warm-season grass stands should be obviously successful by the second growing season. These should not be considered a failure until after 3 years.

Buying Seed
When ordering Warm Season Grasses and Forbs it is critical that the seed is expressed in Pure Live Seed (PLS) and that you keep the seed tags. It is recommended that you order a little extra seed so you can calibrate the drill and so you do not run out of seed during planting.
PLS is the viable seed that will grow minus the trash. PLS is calculated by adding the percent germination (G) and the percent hard seed (H) then multiplying the percent purity (P). PLS = P (G+H) x 100. The percent PLS multiplied by the bulk weight gives the pounds of PLS.
It is also worth looking into conservation organizations for cost-share on establishing these practices. Several conservation organizations are available to help landowners.

Fertilizer
For successful establishment, test soil and apply needed phosphorus, potassium, and lime prior to seeding. Soil pH should be at least 6.0. **DO NOT APPLY NITROGEN**. Even small amounts of nitrogen stimulate weed growth and retard establishment of native warm-season grasses.

Site Preparation
It is important to prepare the site before a native grass planting. Areas being converted from crop to prairie habitat should be planted to beans the year prior to planting to native grasses. Corn leaves to much chaff on the ground to thoroughly drill seed. However, burning the corn residue can relieve this problem

Areas being converted from fescue or brome should be treated a minimum of 2 times in order to change the cover type. These species should be sprayed in the fall before plants reach dormancy. This area should then be burned off in late winter to open up open ground. When spring arrives, wait for the area to green back up again and spray it again. When the entire area is dead, you can burn again (if there is enough fuel to carry a fire) and plant directly into the area at that point.

Native Conversion

Spray in fall and burn late winter/early spring

2nd treatment conducted in spring after green up

Plant into it after the 2nd treatment

ESTABLISHING WARM-SEASON GRASSES AND FORBS

Establishment Methods - It may take multiple applications of chemicals until the appropriate kill has been achieved for the desired seeding area. The seedbed should be devoid of anything prior to planting (crop residues are ok prior to planting).

1. **Spring No-till Planting** - Early Spring (April 1st – June 15th)

No-Tilling reduces soil disturbance thereby lowering annual weed pressure. It also conserves soil moisture, insures good seed to soil contact, and provides excellent erosion control. Plant native Grasses and Forbs using a special No-Till Drill designed to handle fluffy seeds. They can be directly planted into existing fields with crop residue. If weeds and undesirable grasses have inundated the field apply a 2% glysophate product per acre to kill existing vegetation. Plateau Herbicide can be added at 4 oz. per acre to act as a pre-emergent. This will depend on the seeds to be planted (e.g. Switchgrass and Plateau do not mix!!). Consult experienced operators for detailed advice.

2. **Clean Seedbed Planting** – Spring (April 1st – June 15th), fall (November 15th – Freeze Up)

Eliminate prior crop residue or sod by plowing in late fall. Disk shallow to kill each new crop of sprouted weeds until planting time. If using a no-till drill roll or cultipacked just prior to seeding and again just after. If seed is broadcast, increase seeding rates by 25% over no-till drill seeding rates. Broadcast Seeds should be covered with no more than one-fourth inch of soil and some exposed seed is good. Do not harrow after seeding. Avoid planting too deep.

3. **Seeding Using Fertilizer Air Spreaders** –
   Spring (April 1st – June 15th), fall (November 15th – Freeze Up)

Native grass and forb seed can also be spread using an air spreader. Small amounts of fertilizer (approximately 100-150 pounds/acre) are used as a carrier to keep the "sticky" seed flowing down the tubes of the booms. Choose a fertilizer dealer who has air spreader equipment, and explain the procedure you are wishing to use. Advise the fertilizer company of the acreage you are wishing to plant, and that you would like to mix the seed with the fertilizer to apply about 100 lbs of the mixture per acre. Many fertilizer companies have used similar methods to apply cool season grass or clover seed.

4. **Dormant or Winter Seeding** – Late Winter (January – February) - Broadcast

Dormant seeding should be done over bare or mostly bare ground in January or February. Frozen ground is preferred for ease of operation of the spreader. Freezing and thawing of the ground will incorporate the seed into the soil. Increase seeding rates 25% over no-till drill seeding rates. Make sure the seed/fertilizer mix is being spread evenly across the field. If mixture is left over after the field has been covered, instruct the operator to distribute that remainder on the field in a random fashion.

Native forbs come in a variety of colors that flower at different times of the year. Have colorful flowers on your property spring, summer, and fall!!!!

Native seeds only need to be drilled on ¼”

Post-Seeding Weed Control

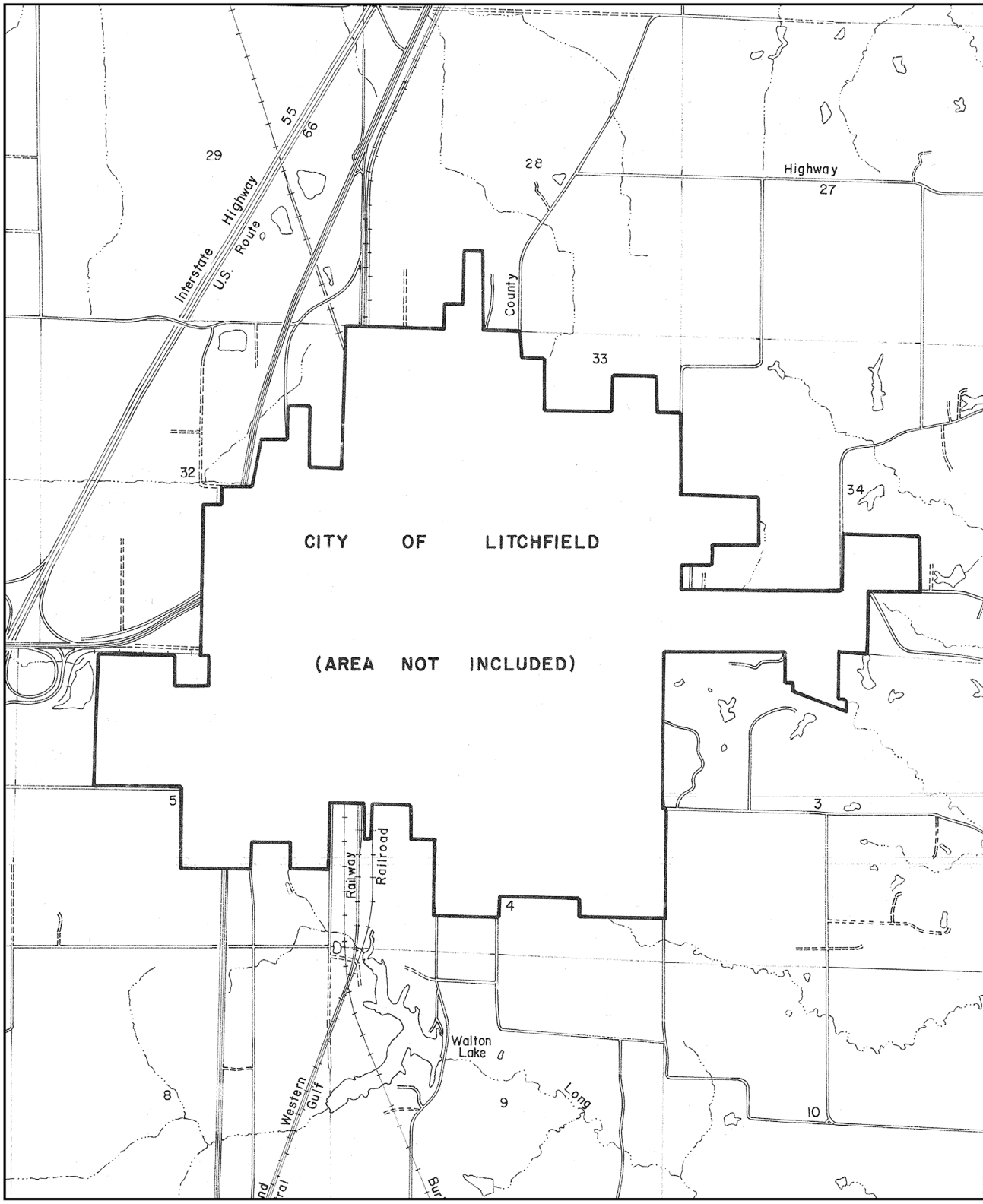
Your Warm Season Grass Field will be weedy the first growing year. During this time it is ok to mow a couple times with a rotary mower to keep the broadleaf weeds controlled. Mow just above the height of your warm season grasses to cut the tops of the broadleaf plants before they seed out. This will help cut back on weed competition and allow the warm season grasses to receive sunlight. If your field is still weedy during the second growing season Mow one time during early spring no lower than 10 inches high. By the third year, grasses should be well on their way and will out-compete weeds.

Field Evaluation - Establishment of Warm Season Grasses can be discouraging; warm-season grasses emerge in late spring and most grow quite slowly the first season. Growth is usually very rapid in the second growing season, but may take three years. Many first-year stands are prematurely judged a failure by inexperienced persons. Under the right conditions, native warm-season grass stands should be obviously successful by the second growing season. These should not be considered a failure until after 3 years. Look for native grass seedlings to emerge about two weeks after the soil temperature reaches 65 degrees F. The seedlings look similar to annual grasses such as foxtail. One difference is the native warm season grasses will show a deep red color at the base of the plant where the stalk meets the soil. WSG grows slowly the first year; 40 - 50% of the seed may be hard or dormant. Emergence from the seed may not take place until the following spring. By August, if you have one live WSG plant per square foot, you will have an excellent stand.

4 months after planting

16 months after planting

Appendix M: FIRMette


Interstate Highway
U.S. Route
55
66
29
28
Highway
27
County
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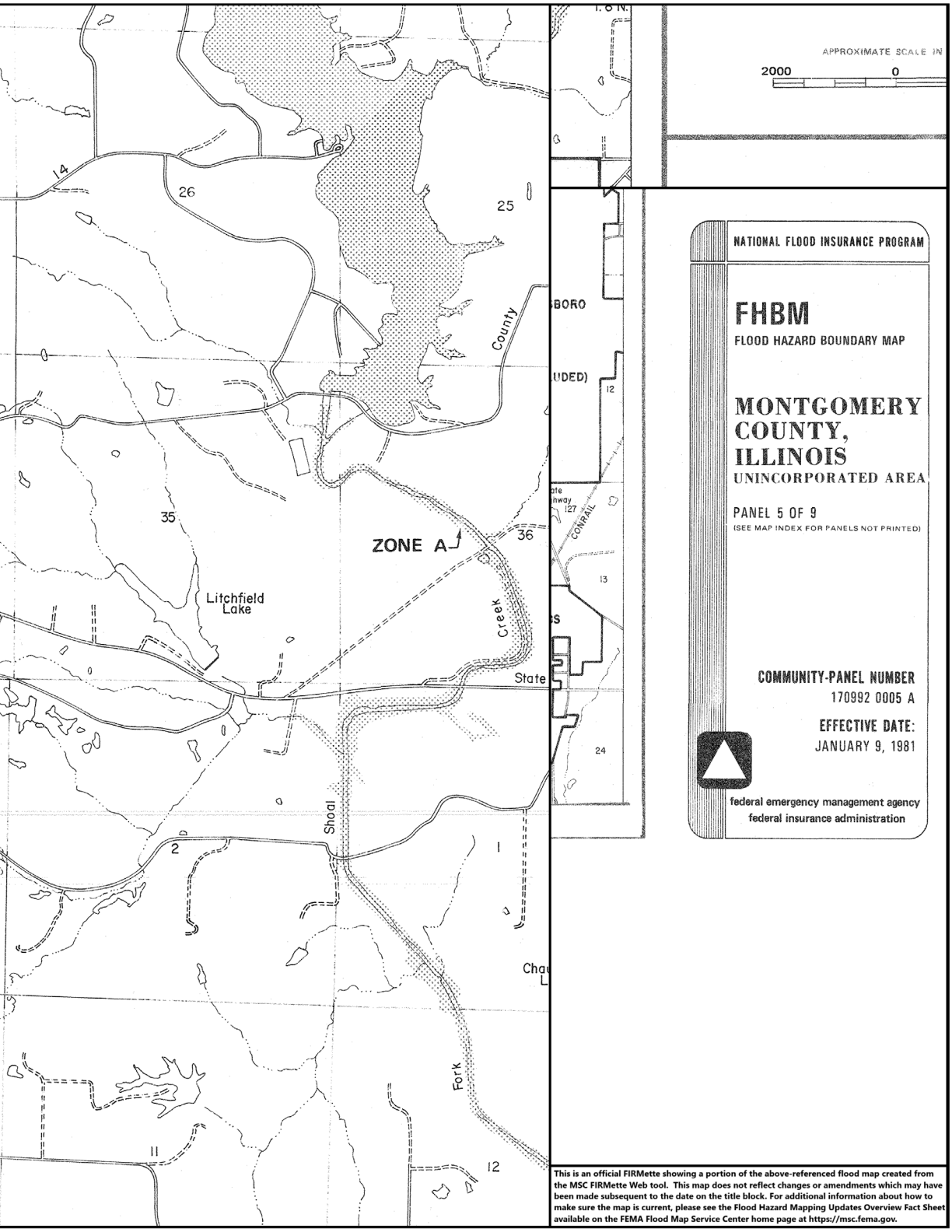
32
34
CITY OF LITCHFIELD
(AREA NOT INCLUDED)
5
3
4
Railway
Railroad
Walton
Lake
8
9
10
Western
Gulf
Long


APPROXIMATE SCALE IN
2000
0
NATIONAL FLOOD INSURANCE PROGRAM
FHBM
FLOOD HAZARD BOUNDARY MAP
MONTGOMERY COUNTY, ILLINOIS
UNINCORPORATED AREA
PANEL 5 OF 9
(SEE MAP INDEX FOR PANELS NOT PRINTED)
COMMUNITY-PANEL NUMBER
170992 0005 A
EFFECTIVE DATE:
JANUARY 9, 1981
federal emergency management agency
federal insurance administration
ZONE A
Litchfield Lake
Creek
State
Shoal
Fork
County
CONRAIL
26
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1
11
12
24
This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at https://msc.fema.gov.