From: Jeremy Price <jprice@renewprop.com>
Sent: Thursday, November 9, 2023 12:32 PM
To: VanKerkhoff, Mark <vankerkhoffmark@KaneCountyIL.gov>; Berkhout, Keith <BerkhoutKeith@KaneCountyIL.gov>
Cc: Pierog, Corinne <CPierog@kanecoboard.org>; Williams, Rick <RWilliams@kanecoboard.org>; esther.mongan@central301.net; Stephanie Loucas <stephanie@renewprop.com>; Benjamin Jacobi <BJacobi@Polsinelli.com>
Subject: EX: Petition #4615 - Plato Road Site Plan Update & Memo

Good Afternoon Mark and Keith:

For continuity and convenience, I have copied Madam Chair Pierog, Commissioner Williams, as well as Dr. Esther Mongan with CCSD 301.

On RPIL Solar 8 LLCs behalf, please find the Project's revised site plan and accompanying Memo for the County Board's consideration.

We appreciate everyone's assistance to date and will see many of you following the long weekend.

I am available to answer any questions in the interim.

Thank you.

Sincerely,

Jeremy Price
Project Developer

RENEWABLE PROPERTIES

M: (978) 382 - 1751
jprice@renewprop.com

Renewable Properties, LLC
44 Montgomery Street, Suite 3150
San Francisco, CA 94104

November 9, 2023

Kane County Board
Kane County Government Center
719 S. Batavia Ave, Bldg A
Geneva, IL 60134

RE: Public Comment Regarding Petition #4615 for a Special Use Permit to Develop a 4.99 Megawatt Solar Energy Generating Facility

Dear Madam Chair Pierog & County Board Members:

I am writing on behalf of RPIL Solar 8, LLC ("Developer"), as well as Robert & Linda Matson ("Landowners"), and offer this letter and its exhibits as public comment ahead of the November 14, 2023 County Board meeting to help provide both additional context and recent updates to the Project's plan for your consideration. The Developer has been working closely with involved parties to address comments that have raised during the permitting process.

Background

The Developer and Landowners are seeking a special use permit to develop a 4.99-megawatt (MW) ("Project") on approximately 36 acres of the 56-acre parcel. The Project produces enough energy to power approximately 1,700 homes. The Developer presented an application for a special use permit to the Zoning Board of Appeals ("ZBA") on September 12, 2023, and demonstrated at that hearing that the proposed Project complies with all requirements in the Kane County Zoning Code, including Ordinance No. 23-178 (the "Solar Ordinance"), and the Illinois state siting statute codified at 55 ILCS 5/5-12020, as amended on January 27, 2023.

The Project is compliant with the Solar Ordinance and siting statute; however, a few members of the public (including one neighbor) expressed concerns regarding potential impacts on property values and the environment at the ZBA hearing. The ZBA did not deliberate or make any oral or written findings of fact on the record. The ZBA recommended denying the application without additional explanation.

Timeline and Special Use Permit Findings

The Project was initially scheduled to be heard by the Development Committee on September 12th; however, to conduct additional outreach to parties who had not been heard from, the Developer requested a continuance to the Committee's next meeting. On October 17, 2023, the Developer and Landowners presented the application to the County Development Committee.

To address community questions and concerns raised at the ZBA hearing, the Developer presented, as public comment, a "Technical Memorandum" to the Development Committee that responded directly to the concerns raised by the community members at the ZBA hearing.

This Technical Memorandum is attached as **Exhibit A** to this letter. It discusses, among other things, the Matson's life-long presence (a 5th generation family) and commitment to Kane County, the Developer's outreach to neighbors, and the School District ("District"). Additionally, studies were provided demonstrating that the Project will not affect property values, and land or water quality including stormwater drainage and the environment. Finally, it describes the planned robust vegetative screening. Mr. Matson spoke at the Development Committee meeting, as did a property valuation expert, Andrew Lines from the Chicago-based CohnReznick, who confirmed that the Project will not affect property values.

> The Development Committee voted to ***recommend approval*** of the application to the County Board. The Development Committee's recommendation is consistent with state law and the Solar Ordinance. Under 55 ILCS 5/5-12020(g), "A request for . . . a special use permit for a . . . commercial solar energy facility . . . shall be approved if the request complies with the standards and conditions imposed in this Act, the zoning ordinance adopted consistent with this Code, and the conditions imposed under State and federal statutes and regulations." (emphasis added).

Accordingly, as the evidence in the record demonstrates that the application for a special use permit complies with the Solar Ordinance and the state siting legislation, the Project respectfully requests that the County Board approve this application.

The Developer received an email on October 31, 2023, from the District stating its concern about student health related to unspecified sources. On November 1, 2023, the Developer was surprised to learn that a representative from the District appeared at the November 1, 2023 Executive Committee meeting and commented about potential hazards to school children from EMF. Further, they noted that the Developer had not responded to their request which was only provided one (1) day prior via email. In this email communication, the District requested an alteration to the project design by removing several rows closest to the school. Notably, the District did not make public comment at the Development Committee meeting. Following receipt of the District's email on October 31st, the Developer reached out on November 1st (one (1) day later) to the District to set up a meeting to better understand their specific concerns and review the design request. A meeting was scheduled for November 2nd, 2023. The District indicated they were not able to join the meeting prior to the scheduled time. When the Developer attempted to reschedule, the District noted that the next available

time to meet was November 13th, to accommodate their schedule a meeting has been set. The Developer looks forward to connecting with the District on November 13th before the County Board meeting the following day.

Response to Provided Comments

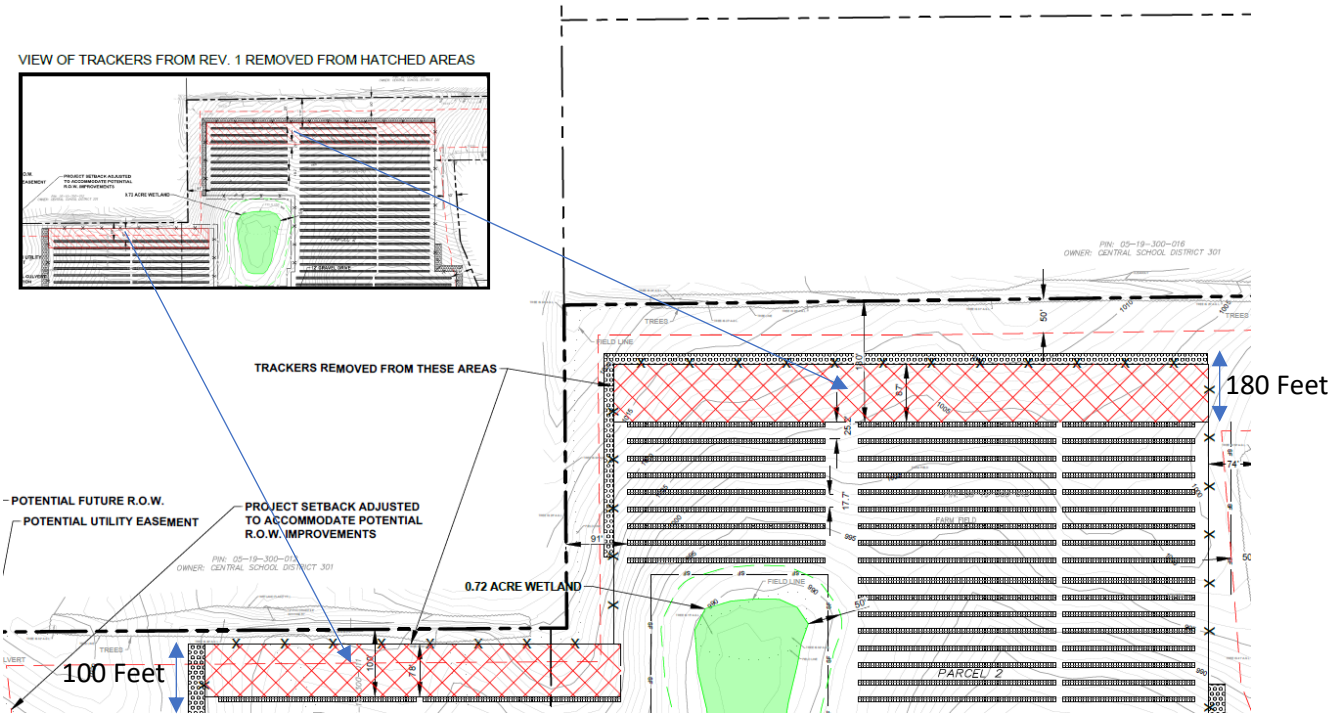
In consideration of this Board's time and to avoid duplication, please kindly see **Exhibit A** for additional detail on previously detailed information.

1. Health Impacts - (EMF)

As discussed at the Development Committee meeting, the Project will not emit EMF at levels that are dangerous to neighbors, including school children, and EMF will not span beyond the project boundary. The Developer has an updated and project-specific detailed report authored by an independent third party, Thomas Cleveland III, Professional Engineer, from Advanced Energy Corporation as **Exhibit B.** Mr. Cleveland is a licensed seasoned professional engineer holding a Master's of Science degree in Mechanical Engineering and is readily considered a leader in health and safety for renewable energy, specifically solar. Included with this report is Mr. Cleveland's signed affidavit attesting to the provided research. Mr. Cleveland's conclusions are further supported by referenced peer-reviewed and/or governmental studies.

Unfortunately, the Developer has not yet had an opportunity to fully engage with the District, and as a further token of good faith working solely from both the District's brief email, and incorporating the District's Communication Director's comments provided at the County Board's Executive Committee meeting, the Developer has increased the setbacks along the entirety of the shared property boundary with the District, with increased consideration in front of the elementary school and athletic fields.

The Developer has increased the setback along the Howard B. Thomas Grade School property line to 180', and 100' along the northern property line, an increase of 62.78% and 44.92% respectively from the initial layout (please see red hatch work and inset map below). The Project's increased setbacks are equivalent to the removal of eight (8) seventy-eight (78) module rows and two (2) fifty-two (52) module rows totaling more than 728 modules. This revised site plan is attached as **Exhibit C** for your consideration, with a figure included below for convenience.



For illustrative purposes, the research included in **Exhibit B** indicates EMF from the solar inverters would drop to background levels (<0.2 mG), within 25 feet of an inverter and 100 feet from the Project's main power transformers. The closest distance of an inverter and transformer based on the updated design are more than 190', and 1000' feet away respectively, or more than 7 ½ and 10 times further than the recommended distance.

The Project and Landowners are agreeable to the County issuing a special use permit conditioned on the Project's increased panel setbacks consistent with the provided update, which exceeds the setback requirements established by Kane County and State Siting Bill.

2. School Proximity

According to Generation 180's 2022 report[1], nearly 1 in 10 K-12 public schools has installed solar on site. Preceded by California and New Jersey, as of the issuance of the report Illinois is ranked 3rd in the nation, with solar installations across 508 schools serving more than 309,872 students. As this Board is likely aware Kaneland School District 302 has installed solar facilities at multiple school buildings, including John Stewart & John Shields Elementary School, Harter Middle School, as well as Kaneland High School. In conversations with Kaneland School District 302, Mr. Mark

[1] https://generation180.org/resource/brighter-future-a-study-on-solar-in-us-k-12-schools-2022/

Payton Director of Building and Grounds, graciously offered to discuss their experience with these projects if of interest.

The Developer is willing to collaborate with Central School District 301 to integrate the Project into the curriculum or as otherwise interested. We are optimistic that the proximity to Central School District 301's facilities may help stimulate discussion, interest, or perhaps inspiration among students regarding the local opportunities and challenges[2] and future generations will likely encounter.

In accordance with Section 25-8-1-1 of the County's Zoning Ordinance, the Project respectfully submits that there are by-right permitted uses within the Farming District that pose larger safety concerns than the Project including not limited to:

- Hunting, fishing, fish and game preserves;
- Pigeon lofts and poultry farms as herein defined on tracts of land five (5) acres or greater in size; and
- Pipelines (oil/gas/otherwise)

3. Environment

Following the October 17, 2023 Development Committee Meeting the Developer connected with the Kane County Forest Preserve District ("KCFPD"). The Developer met with the KCFPD's Executive Director Benjamin Haberthur and Patrick Chess, Natural Resource Director, to to review the seeding composition. The Developer worked with the KCFD to incorporate their suggestions and modified the provided seed mix with several species to address regional consistency and to maximize blooming window coverage.

Conclusion

Thank you for the opportunity to provide additional responses to comments and request. We hope that this letter demonstrates our continued efforts to transparently and proactively collaborate with neighbors and the community. The Project is in full compliance with the County's Ordinance and the state siting legislation, accordingly, we respectfully request that the County Board approve our special use permit application. We look forward to bringing this Project to Kane County, and appreciate everyone's support to date. We will be available in person to answer any questions you may have at the November 14th, 2023 County Board meeting.

[2] https://stateclimatologist.web.illinois.edu/climate-change-in-illinois/

Sincerely,

Stephanie H. Loucas
Chief Development Officer
415-710-3834
stephanie@renewprop.com

Enclosures (3):

Exhibit A - Development Committee Technical Memorandum
Exhibit B - Health and Safety Report & Affidavit
Exhibit C - Revised Site Plan & Seed Mix

Cc: (via email w/ enclosure)
Mark Vankerkhoff, Kane County, Zoning Administrator
Keith Berkhout, Kane County, Zoning Planner
Ms. Corinee Pierog, Kane County, Chair – County Board
Mr. Rick Williams, Kane County, District 18 County Board Representative
Dr. Esther Mongan, Central School District, Superintendent
Jeremy T. Price, Renewable Properties, Project Developer
Benjamin Jacobi, Esq., Polsinelli

Renewable Properties, LLC
44 Montgomery Street, Suite 3150
San Francisco, CA 94104

EXHIBIT A

Renewable Properties, LLC
44 Montgomery Street, Suite 3150
San Francisco, CA 94104
www.renewprop.com

Technical Memorandum

To:	Mr. Ron Ford, Chairman & Kane County Development Committee Members
From:	Jeremy Price, Project Developer – RPIL Solar 8, LLC
Subject:	Technical Memo Update
Date:	October 12, 2023

As a follow-up to the September 12, 2023, Zoning Board of Appeals (ZBA) Meeting for the Plato Road Solar Project (Project), RPIL Solar 8, LLC ("Project"), has compiled the following technical memorandum providing additional information and responses to raised comments and/or concerns for this Committee's consideration. This updated memo (please see highlighted text) provides some additional detail on the Project, and outreach updates since the 9/19 Kane County Development Committee meeting.

Project Landowners

Linda and Robert Matson are fifth (5th) generation Kane County residents, who have raised their three children through the Central School District 301 ("District"). Furthermore, at the District's request the Matsons sold a significant amount of acreage to the District which in part enabled the construction of the Howard B. Thomas Elementary School and appurtenant facilities. Linda Matson was a third (3rd) grade teacher for five years within the District, and further supported the District for another 10 years by helping educate those sick or otherwise homebound. Robert Matson is a landowner, retired U.S. military veteran, and served as an auxiliary policeman and fireman for nearly 10 years. Robert has been an active board member of the St. Charles Historical Society since 1963.

Project Outreach

As part of the Project's commitment to transparency and collaboration, in addition to following all state and locally required abutter notification procedures, the Project has on two separate occasions mailed written correspondence to abutters within 250' of the Project site prior to the ZBA hearing. These notification letters included our contact information and an invitation to further discuss any questions or concerns. Municipalities and/or other regulatory entities were contacted directly as part of these efforts. No calls or emails were returned from these mailers.

During the September 12, 2023 meeting, abutting neighbors Gregory and Lynn Peloquin, an abutting provided testimony. Immediately following the ZBA Public Hearing, the Project reached out (home and work phone) directly to discuss their comments. Prior to the Board's Development Committee Meeting

on September 19, Mr. Peloquin, confirmed (in person) receipt of our messages and indicated that there was nothing further to discuss.

During the ZBA public hearing, testimony was also provided by the District's Communication Director that the Project had not reached out to the District, as indicated during our presentation. The Central School District was a recipient of both mailers outlined above. Additionally, the Project had left direct messages for the District's Superintendent, Dr. Esther Mongan, and sent a follow-up email on August 1, 2023. Following the ZBA hearing, the Project followed up again with the District, and we have successfully scheduled a meeting for the week of September 25th, 2023.

As agreed to during the 9/25 meeting with Superintendent Mongan and the District's Communication Director, the Project provided the requested information on October 11, 2023 via email (**Exhibit B**).

Property Values

One of the main concerns identified during the hearing pertained to potential impacts to property values. As indicated during this meeting, Renewable Properties, LLC has contracted with CohnReznick ("CR"), a leading property Valuation Advisory Services firm based out of Chicago, Illinois. CR has conducted a literature review report.

CR has conducted over 35 studies across 18 states analyzing both residential and agricultural properties, the findings of which indicate that solar facilities have not "caused consistent and measurable negative impacts on Property values". Furthermore, their findings have determined that solar farms have "not deterred the development of new single-family homes on adjacent land". Lastly, CR has conducted a series of interviews with more than 60 County and Township assessors where at least one solar project is located. These interviews have confirmed solar farms do not negatively impact property values. Assessors from LaSalle, Winnebago, Fayette, and Champaign County within Illinois were included in the mentioned interviews. The Project is willing and able to provide a copy of the literature review-based Property Value Impact Report as deemed useful.

The Project will have a representative from CR present at the upcoming Development Committee meeting to answer questions or concerns.

Toxicity and Water Quality Issues

Please find the below excerpt attesting to the non-toxicity of panels from the attached Health and Safety Report included in **Exhibit A.**

"In 2019, an international team of experts conducted an International Energy Agency (IEA) - Photovoltaic Power Systems Program (PVPS) study to assess if there is a public health hazard caused by lead leaching from the broken silicon PV panels during the life of a utility scale solar facility. The study simulated worst-case scenarios, unlikely to be experienced by an actual solar facility, utilizing conservative assumptions to evaluate extreme scenarios. The study examined worst-case exposure routes of soil, air, and ground water for a typical 100 MWAC PV facility for crystalline modules. For example, the worst-case residential groundwater exposure assumed that all broken panels from the entire array were exposed to acid rain,

for an entire year, and any chemicals released from every broken panel transported to the same groundwater well located just 25 feet away. Again, this is not a realistic scenario, but it was assumed in order to generate the most conservative potential outcome. The study found that under this very unlikely, worst-case, scenario, lead exposure via groundwater was four orders of magnitude (i.e. a factor of more than 10,000) less than the maximum levels defined by the EPA to have no adverse health effects, which is the same standard used for public drinking water in the U.S. This study demonstrates that there is no risk to public health from lead or cadmium leached from broken PV panels."

Additionally, most newly manufactured panels use a lead-free solder as part of the manufacturing process, further reducing the risk of impacts to the soil or groundwater. During regularly scheduled maintenance visits, panels are evaluated for damage and/or irregular wear. As necessary, panels are replaced where damage is discovered. The Project's expected panels have received their IEC 61215 accreditation which reviews the quality and safety of materials and under simulated stress conditions, evaluates potential for defects, failures, and panel leakage from moisture or weather conditions.

Given these results, it is unlikely that panels on the site in operating conditions would pose any threat to soil, stormwater, or groundwater, including downstream Cardinal Creek Forest Preserve. Based on the expected erosion reductions through the meadow conversion and additional plantings, water quality leaving the Project limits would be improved over today's conditions.

School District Solar Facility Proximity

Various school districts throughout Illinois have chosen to use solar energy to power their schools. No adverse effects have been documented, and the schools have benefited from the energy generated. Several local schools (e.g. Huntley Community School District 158 and Mooseheart) have installed ground-mounted systems on-site.

Access & Visibility

The Project was designed to abide by ordinance requirements for easements, as well as future right-of-way accommodation. Vegetative screening will be installed as necessary to mitigate views of the panels themselves. A mix of deciduous trees, shrubs, and other plantings will be used to ensure that screening is present year-round. The Project is willing to further coordinate with the abutting landowners on potential adjustments and/or modifications.

Stormwater

There were expressed concerns that stormwater leaving the property would impact downstream residents. The Project's existing conditions are agricultural land, subjected to compaction as a result of continuous farming. The proposed condition will be a meadow (native grasses and forbs) with little additional impervious area aside from the gravel access road, panel posts, and equipment pads. The proposed conditions will allow for a lower site outflow compared to existing conditions, as the proposed land type will allow for better stormwater infiltration. As detailed by the stormwater report included in the petition, the Project is expected to yield reductions in site runoff compared to the existing conditions during the modeled 2-year and 100-year storm events. These reduction calculations are 27% and 12.8%

respectively. Please note that these estimates are conservative and do not account for the additional plantings to be installed by the project which will provide additional infiltration, bioremediation, and other benefits.

The existing on-site wetlands will be maintained and not impacted by the proposed development. Panels will not collect or impact stormwater drainage, and existing flow patterns will be maintained.

Cardinal Creek Forest Preserve Proximity

Upon further review, please accept the Project's acknowledgement and apology that the Cardinal Creek Forest Preserve was overlooked at time of submission, this was not omitted nefariously. In accordance with Section 25-5-4-9 of Kane County's Zoning Ordinance, the Project meets the requirement that "the Commercial Solar Energy Facility will avoid protected lands".

Please find the below distance (feet) summary of the Project features measured to the closest point of the Cardinal Creek Forest Preserve Boundary.

- Parcel Boundary – 500'
- Project Fence – 760'
- Project Solar Panels – 780'

From: Jeremy Price
Sent: Wednesday, October 11, 2023 11:01 AM
To: esther.mongan@central301.net
Cc: Jeremy Price
Subject: RE: Renewable Properties - Plato Road Project Information
Attachments: Plato Road Application Landscape Plan_2023.pdf; Renewable Properties_Health & Safety Solar Report (2023)..pdf

Superintendent Mongan:

As a follow-up to our phone call on September 25, 2023, please find the compiled information and attachments as requested.

- **Landowners**

  The Project's landowners, Linda and Robert Matson are fifth (5^{th}) generation Kane County residents, who have raised their three children through the Central School District 301 ("District"). Furthermore the Matson's, at the request of District sold a significant amount of acreage to in part enable the construction of the Howard B. Thomas Elementary School. Linda Matson was a third (3^{rd}) grade teacher for five years within the District, and further supported the District for another 10 years by helping educate those sick or otherwise homebound. Robert Matson is a landowner, retired U.S. military veteran, and served as an auxiliary policeman and fireman for nearly 10 years. Robert has been an active board member of the St. Charles Historical Society since 1963.

- **Tax Generation**

  With the understanding that we can not predict tax rates or other variables set by the Illinois Department of Revenue, our model indicates that over life of the Project, it would generate roughly $710,000 for the School District itself. For comparison purposes, using the FY 2022 tax year, the difference in taxes (county-wide) which the Project would generate compared against the highest tax bill of the properties abutting the District's facilities is more than $23,478, or a 179.17% increase.

- **Screening layout and details**

  Please see the attached Landscaping Plan which identifies the location, heights, and proposed vegetation types which would screen the project and provide other valuable ecosystem services.

- **Health and Safety Information**

  Please see the redacted Health and Safety Study, all redactions are of the project name this report was submitted for.in a different state – the facts remain the same. As outlined in the report, solar would not negatively affect the surrounding environment or the District's stakeholders. Secondary benefits of the project's vegetation and ground cover includes the reduction of soil erosion and restoration of soil health. The proposed vegetation could further help screen and filter airborne soil from abutting agricultural actives, thereby improving air quality for the nearby athletic facilities, playgrounds, etc.

  As noted in our call, various school districts (e.g. Huntly Community School District 158 & Mooseheart) throughout Illinois and the country have on-site solar facilities without documented adverse effects or impacts.

- **Project Benefits**

In addition to the tax benefits outlined above, the Project is funding three-phase electrical line upgrades which the District's buildings will benefit from (capacity/resilience) being on the same circuit running along Plato Road.

The Project is also willing to further discuss alternative ways in which it can potentially support the District, through financial contributions to District initiatives and/or programs (e.g. new scoreboard, etc.). Please let us know if this is something you'd like to further discuss.

To help us better evaluate the potential benefits to the Central School District through electricity program participation, we'll need a little more information regarding the District's electricity "Rate Class" classification with ComED, and overall electricity consumption. If a recent bill could be provided (feel free to redact any account information or values), we can work with our team here and provide some information. Otherwise, if you'd provide the direct Rate Class, and recent annual consumption, it would be appreciated. The Rate Class on the bill would likely start with a letter (B,H,R) and have two numbers after it. Please let me know if there are any questions or concerns there.

Please do not hesitate to reach out with any follow-up questions.

Sincerely,

Jeremy Price
M: (978) 382 - 1751
jprice@renewprop.com

EXHIBIT B

STATE OF ILLINOIS **KANE COUNTY**

SPECIAL USE PERMIT FOR SOLAR FACILITY)
)
)

AFFIDAVIT OF THOMAS H. CLEVELAND, III

IN RE: **RPIL Solar 8, LLC – "Plato Road" Solar Facility**
Ground-mounted distribution-connected solar facility
Location: +/- 56.33 acres located off Plato Road, Hampshire, Kane County, IL 60140

NOW COMES the undersigned Affiant, who, being first duly sworn deposes and says of his own personal knowledge as follows:

1. I am over the age of eighteen years of age and competent to testify as to the matters set forth in this Affidavit.

2. I am a solar industry professional and hold a Bachelor's of Science degree and a Master's of Science degree in Mechanical Engineering, both from North Carolina State University. Since April 2017 I have held the full-time position of Solar Engineer at a non-profit energy engineering consulting firm based in Raleigh, NC. For the previous twelve years, I was an engineer with the NC Clean Energy Technology Center, a public service center in the College of Engineering at North Carolina State University. For the last several years at NCSU I was the Renewable Energy Project Coordinator where I led the Center's solar energy program, which included providing technical support to a wide range of solar projects and stakeholders.

3. I gained first-hand knowledge about solar farm design, how they are constructed, how they operate, and on issues regarding interconnection of distribution-connected and transmission-connected inverter-based resources. A true, accurate and genuine copy of my Resume is attached hereto as Exhibit A and incorporated herein by reference.

4. Over the years, I have attended numerous conferences and workshops on solar technology development, written white papers addressing solar energy topics, and conducted peer reviews of papers related to the design, implementation, and safety of solar farms and solar technology.

5. Applicant, Renewable Properties, LLC via RPIL Solar 8, LLC, proposes to construct a utility-scale solar facility ("Project") on +/-56.33 acres located off Plato Road, Hampshire, Kane County, IL 60140 ("Property").

6. I have been retained as an independent expert by Renewable Properties, LLC to determine whether the proposed utility scale solar facility use will or will not materially endanger the public health or safety if located according to the plan submitted. In this role I do not represent any organization, including my employer where I am employed as a solar engineer.

7. I have reviewed the site plan for the proposed solar facility submitted to the county and dated 8/25/23.

8. When evaluating the impact of a solar farm's impact on public health or safety, I consider impacts related to construction of the solar farm, operation of the solar farm, and maintenance of the solar farm.

9. I was the lead author of a North Carolina Clean Energy Technology Center at NC State University white paper on the Health and Safety Impacts of Photovoltaics. The purpose of this paper was to address concerns of public health and safety for utility-scale solar photovoltaic (PV) projects. After broad research of the academic literature and interviews with national experts, potential negative health and safety impacts of photovoltaics were categorized in the four following sections: (1) Toxicity, (2) Electromagnetic Fields (EMF), (3) Electric Shock and Arc Flash, and (4) Fire. In the first two categories (toxicity and EMF), the negative health and safety impacts of utility-scale PV development were found to be negligible. In the last two categories, some risk of negative safety impacts to personnel working on the Project were identified, but the risks in these categories are not significantly different that the risks for personnel working on any electrical systems. The conclusion of the paper is that the public health benefits of installing ground-mounted PV facilities are significant, and the negative impacts to public health and safety are negligible.

10. The NC State University white paper on Health and Safety Impacts of Photovoltaics was focused on North Carolina but none of its significant findings are different in Illinois.

11. Recent research by the International Energy Agency Photovoltaic Power Systems Programme assessed the human health risk of photovoltaics in a series of three reports that addressed 1) Fire risks, 2) Breakage risks, and 3) Module Disposal Risks. Each study was conducted by an international team of leading experts on the topic. All three studies considered worst-case situations and concluded that the potential health risk was well below established screening thresholds, which means that the risks are too low to warrant a closer study of the potential risks. The conclusions align with the conclusions in the NCSU paper that the risks are negligible.

12. I have conducted a site-specific assessment of the potential positive and negative health and safety impacts of the Project and prepared a written executive summary summarizing the findings and conclusions.

13. Electricity generation by solar photovoltaic systems reduces the burning of fossil fuels for electricity generation. This reduction of fossil fuel consumption reduces air and water pollution, resulting in cleaner air and water, which has a significant positive public health benefit, especially to the portion of the population most vulnerable to the impacts of poor air and water quality.

14. In 2017 the US Environmental Protection Agency (EPA) conducted a study to determine how much pollution PV systems save and to estimate the public health value of the cleaner air, water, and soil they provide. These experts calculated that in the mid-Atlantic, based on the sunshine available, the way electricity is produced, and the public health impacts of fossil fuel-fired electricity, every kilowatt-hour (kWh) of utility-scale solar electricity produced provides 3.1 to 7.0 cents of public health benefit. At this rate of benefit the Plato Road facility will produce over $10 million dollars of public health benefits over its lifetime.

15. All the energy required to manufacture solar panels and to construct a utility-scale solar facility is paid back by the energy produced by the solar facility in approximately 1 year of operation.

16. The proposed solar facility will consist of photovoltaic (PV) modules ("Panels") mounted on racks that are driven into the ground. These Panels are safe and create no site emissions. Solar facilities enjoy widespread support from environmental organizations.

17. Solar technology like that proposed for the Project is not new. Similar solar panels have been in operation for more than 40 years in the United States.

18. All electric components are required to be certified to be in compliance with the appropriate Underwriters Laboratories (UL) safety standards and are required to be installed in compliance with the edition of the National Electrical Code in effect at the time of construction.

19. There is little flammable material in the equipment of a solar facility, but as with any electrical system there is some risk of a fire. No special equipment is required to respond to a fire incident at a utility-scale PV facility. The generally recommended response to a fire is to open electrical disconnect switches and allow the fire to burn itself out. If needed, water may be used to put out any brush or grass fire.

20. The electricity produced by the solar photovoltaic system will be sent to the local electric grid and used to serve electrical demands in the vicinity of the proposed solar facility.

21. Electricity is vital for our everyday modern lives and our growing economy, and aging traditional generation plants, such as natural gas and nuclear, will need to be shut down and replaced with new generation facilities. Solar energy is a clean, inexpensive, and sustainable resource that should be preferred to conventional sources of power such as coal, gas, and nuclear energy. These conventional sources of electricity are finite resources that require significant environmental disruption and public safety risk to extract and utilize.

22. Electricity generation by photovoltaic systems reduces the required capacity of other generation sources, such that installation of PV systems reduces the required number and/or size of fossil fuel power plants required to meet a utility's electrical demand.

23. From my research, education, and experience, I know that PV module toxicity does not pose a threat to public health or safety. Modern silicon-based PV modules contain about 76% glass, 10% polymer (plastics), 8% aluminum, 5% silicon, 1% copper and less than 0.1% of silver, tin, and lead. Cadmium Telluride (CdTe) thin-film modules are about 97% glass and 3% polymer, with other metals including nickel, zinc, and tin.

24. At the end of the economic life of the solar panels they are likely to still produce at least 80% of their original output, so many of the Project's panels may be sold for continued use. If not reused, PV panels can be recycled. If the panels are not reused or recycled, then they will be required to be disposed of in accordance with federal, state, and local waste management laws.

25. From my education and experience, I know that electromagnetic fields (EMF) are produced by a variety of natural sources as well as the production and distribution of electrical

power. For example, magnets, electric tools, computers, radio and television transmitters, mobile phones, medical devices, and the earth itself produce various frequencies of EMF. Ordinary household appliances such as televisions and refrigerators produce EMF, as does the electrical wiring in our homes. EMF strength attenuates rapidly as the distance from the source increases.

26. PV panels produce direct current electricity which produces essentially zero EMF. The magnetic field it does produce is so weak that it has little effect on a compass.

27. Inverters that convert electricity from direct current (DC) to alternating current (AC) power will either be pad/skid-mounted central inverters located in the interior of the solar facility or much smaller string inverters (as is planned for the Plato Road project). Although the inverters (and the short wires from central inverters to transformers) produce more EMF than any other part of a PV system, the strength of the fields are not very strong and decline in strength rapidly with distance, such that EMF measured at the perimeter of the physical facility (whether central or string inverters are used) is expected to be immeasurable above existing background EMF already present in the environment. The proposed solar facility will not expose any neighbors or passers-by to any more EMF than the existing electrical lines.

28. The inverters and transformers in the Project will generate some sound while they are generating electricity, but if installed at the proposed locations the sound is not expected to be noticeable at the perimeter fence of the project.

29. Based upon the facts stated herein, my training and experience in the solar power industry, and my familiarity with this proposed project, it is my professional opinion that the proposed solar facility will not endanger the public health or safety if located and constructed according to the proposed plan.

Further the Affiant Sayeth Not.

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SIGNATURE & NOTARY FOLLOW

This, the 9th day of November, 2023.

THOMAS H. CLEVELAND, III

Wake COUNTY, NORTH CAROLINA

Signed and sworn to or affirmed before me this day by Thomas H. Cleveland, III

Date: November 9th, 2023

[Notary's signature as name appears on seal]

Ethan R. Dellinger, Notary Public

[Notary's printed name as name appears on seal]

ETHAN R. DELLINGER NOTARY PUBLIC JOHNSTON COUNTY, NC

My commission expires: July 10, 2024

[Affix Official Seal in Space Above]

Exhibit A:

Thomas (Tommy) H. Cleveland, P.E.

4141 Laurel Hills Rd. Raleigh, NC thcleveland@gmail.com 919-923-5490

Education & Training

North Carolina State University, Mechanical Engineering M.S. 2004
North Carolina State University, Mechanical Engineering B.S., Business Mgmt. minor 2001 - Summa Cum Laude
Lumberton Sr. High School, Lumberton, NC, 1997 – Valedictorian

Professional Engineer (P.E.), North Carolina (#033711) since 2007, South Carolina (#37453) since 2019, and VA (#402063889), OH (PE.86943), and FL (#91941) since 2021.

Professional Experience

Solar PV Engineer, Advanced Energy (non-profit energy engineering firm), Raleigh, NC, April 2017–Present

- One of 3 lead engineers on a team of 9 conducting interconnection commissioning of utility scale photovoltaic systems for Duke Energy in NC, SC, and FL, as well as for other utilities
- Lead engineer for transmission-connected PV and Battery project interconnection commissioning, including working closely with utility engineers to develop capability and performance requirements and verification process
- Lead engineer for interconnection commissioning of several MW-scale PV plus Battery Energy Storage Systems (BESS) for Duke Energy and electric cooperative utilities
- Review of single line diagram for compliance with interconnection agreement and required interconnection and construction standards.
- Evaluation of utility-scale solar PV facilities to assess the quality of design, construction, and operation for electric utility interconnection commissioning
- Writing detailed engineering report of required, completed, and recommend corrections for PV facility to complete the interconnection commissioning process
- Technical support to engineers and contractors to determine optimal correction solutions
- Approval of all correction work, both via photos and in-person
- Review of settings in site protection system (recloser control) and site power/energy meter for each PV facility
- Developed spreadsheet to facilitate consistent review of SEL-651 and SEL-751 recloser control settings
- Lead commissioning test of distribution-connected utility-scale PV facilities, which includes approving inverter and recloser settings, confirming meter and recloser phasing, 3-phase and 1-phase anti-islanding testing, and testing of inrush mitigation systems.
- Engineering analysis and concise presentation of results to customers
- Failure investigation of commercial PV facility
- One of 2 or 3 trainers of Annual 4-hour Duke Energy Training on Interconnection Commissioning for developers and contractors building utility-scale PV systems in Duke Energy territory in North and South Carolina (2018, 2019, 2020)

Solar Energy Engineer (various progressive titles), North Carolina Solar Center/NC Clean Energy Technology Center, North Carolina State University, 2005-April 2017

- Lead solar engineer at the Center (2008-2017)
- Conducted detailed PV + storage feasibility study for community solar project for a NC municipal utility, included development of battery control model to optimize storage size and validate value production – resulted in constructed project owned by the utility without utilizing tax credits
- Provided quality assurance and technical support to development of in-house training program of solar farm construction for a leading regional utility-scale photovoltaic EPC firm
- Guided design of prototype residential Plug and Play PV system and collected AHJ feedback (Department of Energy SunShot project)

- Led design and development of ISO-17025 accredited solar thermal collector testing lab, only 5th in U.S.
- Managed engineering staff of testing laboratory
- Co-led stakeholder process to develop Template Solar Development Ordinance for North Carolina
- Designed and installed PV field performance monitoring system, conducted performance analysis
- Conducted renewable energy site assessments for commercial, industrial, and institutional clients
- Presented to local government officials, community leaders, and general public on solar energy
- Provided technical support to a wide variety of energy consumers and stakeholders across NC

Expert Witness, indipendent consultant for over 30 solar developers, 2012-Present

- Provided expert testimony for over 100 utility-scale solar photovoltaic projects throughout the United States (8 states), analyzing potential health, safety, glare, and/or environmental impacts of these projects.
- Conducted glare impact analyses and studies for approximately 20 utility-scale photovoltaic system near public and military airports.
- Conducted site-specific studies of EMF and sound impacts

Instructor of 1-Day Continuing Education Course on Solar Energy for Professional Engineers, UNC-Charlotte, Fall 2015, 2016, 2017

- Developed all course content for this 8-hour in-person course
- Course provides introduction to solar energy in North Carolina today for working engineering professionals. The course covers solar energy resource, photovoltaic technology, photovoltaic products, system design, state and federal policy, grid interconnection, project economics, and more
- Based on great attendance and student feedback, twice invited back to teach course for additional year

Instructor of EA 522 PV Design and Installation, College of Natural Resources, North Carolina State University, 2019-2023

- Developed all course content for this new three credit hour online course
- Course covers many aspects of photovoltaic design and installation including energy use, solar resource, system design, utility tariffs, estimating, economics, and more
- Course is required for the Certificate in Renewable Energy Assessment and Development

Instructor of ET 220 Solar Photovoltaic Assessment, Department of Forestry and Environmental Resources, North Carolina State University, 2014-2023

- Developed all course content for this new three credit hour online course
- Course covers all aspects of photovoltaic site assessment including energy use, solar resource, system design, utility tariffs, estimating, economics, and more
- Course is optional course for an Environmental Technology and Management degree
- Course is required for a Renewable Energy Assessment minor

Instructor of MAE 421 Design of Solar Energy Systems, Mechanical and Aerospace Engineering Department of North Carolina State University, 2009-2014

- Instructor of the solar energy engineering course, MAE 421, in the NC State University Mechanical and Aerospace Engineering department
- The course was offered during the spring semester and typically had 30 to 50 undergraduate and up to twelve graduate engineering students
- Previously co-instructor of the course for two years (2007, 2009)

Research Assistant, North Carolina Solar Center, North Carolina State University, 2003–2005

- Developed and validated a TRNSYS simulation model of a unique solar thermal concentrating collector
- Assisted with the installation of photovoltaic systems ranging in capacity from 1 kW to 5 kW

Selected Publications

"Balancing Agricultural Productivity with Ground-Based Photovoltaic Development", NCCETC/NCSU white paper, August 2017, https://nccleantech.ncsu.edu/wp-content/uploads/Balancing-Ag-and-Solar-final-version-update.pdf

"Health and Safety Impacts of Photovoltaics", NCCETC/NCSU white paper, May 2017, https://nccleantech.ncsu.edu/wp-content/uploads/Health-and-Safety-Impacts-of-Solar-Photovoltaics-2017_white-paper-1.pdf

"Community Solar (+ Storage) Program Design for Fayetteville Public Works Commission", NCSU/NCCETC report, March 2017, (Public version) https://nccleantech.ncsu.edu/wp-content/uploads/FPWC_CommunitySolar_Public_Version.pdf

T. Cleveland, "What is Solar?", NCSU Cooperative Extension & NCCETC factsheet, October 2016, https://content.ces.ncsu.edu/what-is-solar

T. Cleveland, H. Tsai, "Charlotte-Mecklenburg Schools Roadmap to 100% Renewable Electricity" & "Durham Public Schools Roadmap to 100% Renewable Electricity", NCCETC, February 2016

T. Cleveland, A. Huang, "Plug and Play Residential PV System Innovation and Demonstration", Solar Power International Conference 2015

T. Cleveland, "*Make Solar Energy Economical*", recorded video lecture for E102: Grand Challenges of Engineering course at NC State University, January 2015

T. Cleveland, M. Clark, "*Template Solar Ordinance for North Carolina",* Solar Power International Conference 2014

T. Cleveland, et al, "Template Solar Energy Development Ordinance for North Carolina", NCCETC & NCSEA, December 2013, www. go.ncsu.edu/template-solar-ordinance

M. Sheehan, T. Cleveland, "*Updated Recommendations for Federal Energy Regulatory Commission Small Generator Interconnection Procedures Screens*", Solar America Board for Codes and Standards Study Report, 64 p., July 2010, www.solarabcs.org/about/publications/reports/ferc-screens/pdfs/ABCS-FERC_studyreport.pdf

T. Cleveland, et al, "*Optimizing Solar Thermal Resource Use at Commercial Buildings*", Solar 2010 – ASES National Solar Energy Conference 2010, 6 p., May 2010, www.ases.org/papers/101.pdf

T. Cleveland, "*Description and Performance of a TRNSYS Model of the Solargenix Tracking Power Roof*$_{TM}$", Solar 2005 – ASES National Solar Energy Conference, 6 p.

T. Cleveland, K. Creamer, & Dr. R. Johnson, "*Energy Metering of Solar Domestic Hot Water Systems for Inclusion in Green Power and Renewable Portfolio Standards Programs*", Solar 2004 – ASES National Solar Energy Conference 2004, 6 p.

T. Cleveland, "*Effective Energy Metering of Solar Domestic Hot Water Systems for Inclusion in Green Power and Renewable Portfolio Standards*", Master's Thesis, North Carolina State University, Raleigh, 191 p., April 2004, http://repository.lib.ncsu.edu/ir/handle/1840.16/1152

Synergistic Activities

- Member of IEEE 1547 Conformity Assessment Steering Committee (2018-present)
- Member of International Code Council (ICC) Renewable Energy Membership Advisory Council (REMAC) (2015-2018)
- Member of the Board of Directors of the Solar Rating and Certification Corporation (SRCC) (2009-2015)
- Solar America Board for Codes and Standards (Solar ABCs) steering committee (2009-2013)

HEALTH AND SAFETY ASSESSMENT REPORT

Plato Road Solar

4.99 MW_{AC} Photovoltaic Facility

Kane County, IL

ABSTRACT

This is an assessment of the potential health and safety impacts of the proposed 4.99 MW_{AC} Plato Road Solar photovoltaic facility in Kane County, IL. The assessment evaluates potential positive and negative impacts on public health and safety by considering the project design, equipment specifications, operations, and decommissioning. Most of the project area will contain solar panels, which produce valuable electricity without producing any air, water, or soil emissions. Toxicity is considered in detail in this assessment and was found to pose no material risk to the public. The conclusion of the assessment is that the Plato Road Solar project will not create negative health and safety impacts.

Tommy Cleveland

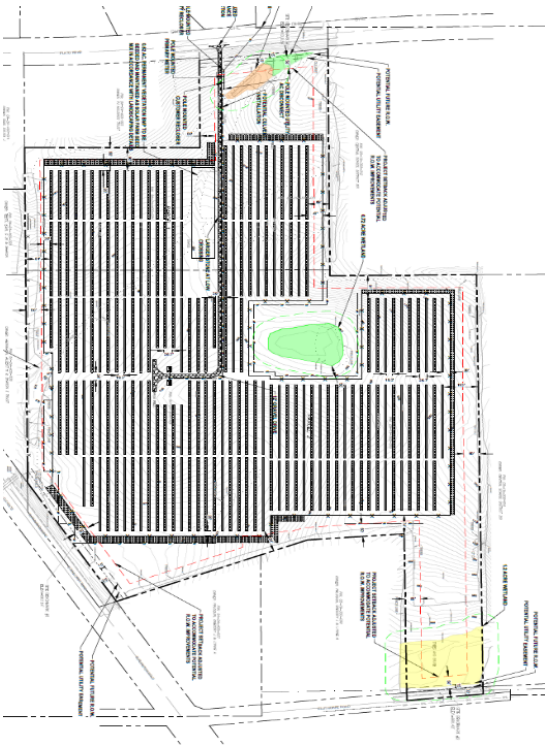
Solar Health and Safety Expert

November 9 2023

Health & Safety Assessment Report

Plato Road Solar Facility – Kane County, IL

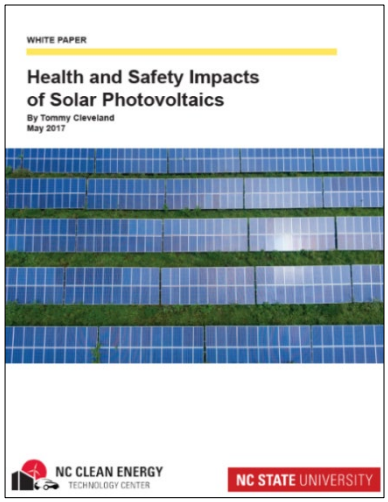
Project Overview:



- **Project Name:** Plato Road Solar
- **Developer**: Renewable Properties
- **Capacity**: 4.99 MW_{AC} (~7.4 MW_{DC})
- **Project Area**: ~36.99 Acres inside of fence
- **Solar Panels**: bi-facial crystalline silicon, BYD Solar MLTK-36 530 Watt, or equivalent
- **Structure**: horizontal single-axis trackers (north-south rows, slowly rotate E to W each day, ATI DuraTrack or equivalent)
- **Inverters**: 125 kW string inverters (40 qty), SunGrow SG125HV or equivalent, dispersed at the end of rows
- **Point of Interconnection**: ComED 12kV 3-phase distribution line along Plato Road
- **Interconnection Equipment**: Metering and protection equipment on a few wooden utility poles along project entrance drive

Report Author

The author of this report is **Tommy Cleveland** (the "Author"), an expert in solar energy and its community impacts, based in Raleigh, North Carolina. Mr. Cleveland graduated from North Carolina State University ("NC State") with undergraduate and master's degrees in mechanical engineering, where he focused on energy. His solar career started with his master's thesis, which led to working over 12 years at the North Carolina Clean Energy Technology Center at NC State University. While at the university, Tommy worked on nearly every aspect of solar energy; from teaching, to testing equipment, to research & development, to leading a statewide stakeholder group in the development of a template solar ordinance. During his time at NC State, North Carolina became the state to install more photovoltaic ("PV") capacity than any state other than California, mostly in the form of 2-5 MW_{AC} utility-scale solar facilities covering around 40 acres each. Utility-scale solar was unfamiliar to the hundreds of communities around the state where the systems were proposed, and many of those communities had questions about the technology and its potential to harm public health or the environment in their community. Many of those questions found their way to Mr. Cleveland and he expanded his already broad knowledge of PV to research and find answers to the questions being asked. Over time he became an expert on the potential health and safety impacts of PV and was the lead author of the 2017 NC State white paper on the topic (pictured to the left). Since mid-2017 Mr. Cleveland has worked as a solar engineer at an energy engineering firm conducting interconnection commissioning of utility-scale solar and battery facilities for utilities in North and South Carolina. In this role Mr. Cleveland was the engineer responsible for (interconnection) commissioning over 60 PV sites and 4 battery sites. Mr. Cleveland has been licensed as a professional engineer in NC since 2007, and is also licensed in SC, VA, FL, and OH.



Executive Summary

This report assesses the potential health and safety impacts of the proposed Plato Road Solar 4.99 MW_{AC} solar facility ("Project"). The Plato Road Solar facility, located in Kane County, Illinois, will utilize crystalline silicon solar panels on single-axis tracking racks that slowly rotate each row of panels to follow the sun across the sky. The Project's 40 small string inverters dispersed throughout the array at the end of rows will convert the DC solar electricity generated by the solar panels into grid-synced AC electricity. A pad-mounted step-up transformer will boost the voltage for connection to ComED's existing distribution infrastructure.

Photovoltaic (PV) panels are not a new technology. They have been used and studied for over 50 years and are well understood by the scientific community. Photovoltaic systems produce emission-free electricity that replaces electricity production from fossil fuel power plants that release harmful emissions. The public health benefits of clean solar electricity are difficult to analyze monetarily; however, the EPA's estimates the value from utility-scale PV in the mid-Atlantic US to be between 3.1 and 7.0 cents per kWh. Even at the bottom end of this range, for **the Project this equates to over $340,000 of public health benefit per year, and $10.2 million over 30 years.**

The limited risks to health and safety from the Plato Road Solar project are not unique to solar but exist for any source or use of grid electricity. These are electric shock, arc flash, and fire. Due to world-class safety regulations in the U.S. and an experienced solar industry, these risks are extremely low, and the secure and isolated nature of ground-mounted PV facilities, including Plato Road Solar, results in negligible risk to the public.

Common concerns regarding toxicity and electromagnetic fields (EMF) from solar facilities are understandable, but the operating characteristics and materials present in the equipment means that neither toxicity nor EMF pose a material risk to public health or safety. The potential for toxicity impacts from PV technology has been studied by academic and regulatory entities for decades, resulting in an understanding that while solar panels may contain small amounts of toxic materials, they pose no risk to public health. Furthermore, EMF is generated by all electricity, including solar PV systems, but does not extend far beyond the physical wires and equipment, so any EMF generated by the Project will not impact anyone outside of the facility.

Other common concerns, such as glare and disposal are also investigated as potential impacts of the Project. The closest airport is over 14 miles from the Plato Road Solar site, so there is no risk causing a glare hazard to aviation. The substantial vegetation buffers will mostly block motorists' view of the panels, so there is no glare hazard for motorists.

When the solar panels reach the end of their useful life they will be removed from the site and reused and/or disposed of in conformance with federal, state, and local requirements. Today the main constituents of the solar panels, racking, and transformers can be recycled within the existing recycling infrastructure. The Project will follow all decommissioning bonding requirements.

In summary, based on my knowledge of science, personal experience with PV technology, review of academic research, and review of materials provided by the project developers about the proposed Project in Kane County, Illinois, my conclusions are summarized as follows:

- The Plato Road Solar project will result in a significant reduction of regional air pollution.
- The Plato Road Solar project will not negatively impact public health and safety.

Introduction

Purpose:

This report assesses the potential health and safety impacts of the proposed Project. It also seeks to educate readers on the health and safety impacts of photovoltaic systems using accurate scientific sources of information.

Overview of Potential Impacts:

The proposed solar photovoltaic (PV) system is likely to remain in operation at least 35 years, and this report considers its potential impacts in Kane County from the start of construction onward, including decommissioning of the project and restoration of the land. This assessment considers all aspects of the project but focuses on those unique to solar projects.

Potential Positive Health and Safety Impacts:

Utility-scale PV projects create a significant reduction in pollution because they produce emission-free electricity that replaces electricity that otherwise would have been largely produced by burning coal and natural gas. Burning these fossil fuels for electricity production is a significant source of air, water, and soil pollution, so reducing their use is a clear public health benefit.

The US Environmental Protection Agency (EPA) conducted a study to determine how much pollution PV systems avoid, and also to estimate the public health value of the cleaner air, water, and soil they provide. These experts calculated that based on several factors, every kilowatt-hour (kWh) of electricity produced by utility-scale solar in the mid-Atlantic provides 3.1 to 7.0 cents of public health benefit.[1] Accordingly, the Project **could produce $340,000-$770,000 of public health benefits every yea**r or approximately $10.3 to $23.2 million over the life of the project.

The positive benefits of photovoltaics are widely understood and well documented, so this report will not address them further. Furthermore, the positive public health impacts of the Project significantly outweigh any health and safety risks as described below.

Potential Negative Health and Safety Impacts:

While all electricity generating facilities provide some potential for negative health and safety impacts, the Project does not present any negative health and safety risks specific to its location or technology choice. The only aspect of PV systems that presents risk of physical harm is the potential for electrical shock, arc flash, or fire, which are hazards present with any electrical system and not unique to solar. There are several other aspects of PV systems that often raise public health and safety concerns, but no other aspect of PV systems poses more than an insignficant risk of negative public health or safety impacts. This report will address all the potential health and/or safety risks of the Project, including common concerns that have no potential for public health impact. Specifically, this report addresses the following possible negative impacts/concerns:

- Electrical Shock and Arc Flash
- Fire and Emergency Response
- Toxicity
- Electromagnetic Fields (EMF)
- Glare

As shown on the landscaping plan, much of the array area will be surrounded by existing trees that will be left as a vegetative buffer or new plantings of several rows of mixed vegetation. This combination of significant setback and thick vegetative screening will separate the public from this project and minimize its impacts, including the visual/aesthetic impact of seeing the equipment.

Before addressing each of the above impact categories, this report provides an overview of utility-scale photovoltaics equipment, facility construction, and operations.

[1] US Environmental Protection Agency, Public Health Benefits-per-kWh of Energy Efficiency and Renewable Energy in the United States: A Technical Report. 2nd Ed, May 2021, www.epa.gov/statelocalenergy/public-health-benefits-kwh-energy-efficiency-and-renewable-energy-united-states

Utility-Scale PV Equipment, Construction, and Operations[2]

To understand the potential impacts of a utility-scale PV system it is helpful to understand the components of the facility, as well as how a facility is constructed and maintained. The components and practices in this overview are typical of the industry and representative of the proposed Project.

Initial Site Work (construction entrance/driveway, sedimentation and erosion control installation, clearing and grubbing, potentially some grading, perimeter fence, and internal roads)



Underground Work (trenching for wires from PV combiner boxes to inverters, inverter pad installation, medium voltage cables to interconnection equipment)



PV Panel Structure/Racking (driving of steel piles, installation of racking "tables", installation of PV panels)

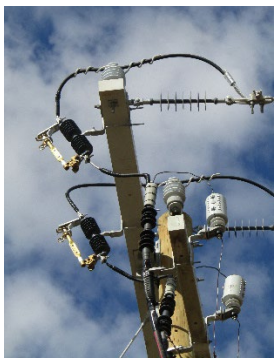


[2] Photo sources: author, ncre-usa.com, NC DEQ, blueoakenergy.com, solarbuildermag.com, hbc-inc.com, solarprofessional.com, ccrenew.com, and landiscontracting.com

Electrical Work (connection of PV module wiring, combiner boxes, inverters, transformers, interconnection facilities)







Establishment of Ground Cover (required to close out sedimentation and erosion control permit)


Operations and Maintenance (24/7 monitoring, vegetation maintenance, preventative maintenance)



Electrical Shock and Arc Flash

Any electricity over 50 volts presents an electrical shock hazard, including the electricity in PV facilities. However, like electrical systems in buildings, the solar facility must adhere to the National Electrical Code (NEC) and the equipment must be certified to the appropriate UL safety standards. Unlike buildings, members of the public are restricted from entering a utility-scale solar facility. To help ensure that only qualified people have access to the equipment, the NEC requires a perimeter security fence with electrical warning signs. The lack of public access coupled with the high U.S. electrical safety standards greatly reduces the risk of electric shock for the public.

Figure 1. Perimeter Fence with Warning Signs

In circuits with significant available fault current there is another electrical hazard, called arc flash, which is an explosion of energy that can occur due to a short circuit. This explosive release of energy causes a flash of light and heat, and creates a shockwave that can knock someone off their feet. The risk of arc flash in a solar facility is no different than the risk at commercial or industrial buildings, except that solar facilities are much less accessible. Equipment with an arc flash risk require arc flash warning labels, and only trained personnel wearing the proper personal protective equipment are allowed to work on it. Due to the secure perimeter and the high U.S. electrical safety standards, there is extremely low arc flash risk to the public.

Fire and Emergency Response

Every electrical system has some risk of fire, including electrical systems in residential, commercial, and industrial buildings. It is this hazard that motivated creation of the National Electrical Code more than 100 years ago. Due to standards required by the NEC, modern electrical systems rarely start fires. Like electrical systems in buildings, photovoltaic systems must also adhere to the NEC. In the rare case that a PV system experiences a fault resulting in a flame, there is very little combustible material present for it to ignite. The only flammable portions of PV panels are the few thin plastic layers, the plastic junction box, and the insulation on its wires.

Heat from a small flame is not adequate to ignite a PV panel, but an intense fire or an electrical fault can ignite a PV panel. One real-world example illustrating the low flammability of PV panels occurred during July 2015 in an arid area of California. Three acres of grass under a utility-scale PV facility burned without igniting the panels mounted just above the grass.[3] Another example occurred recently (2022) in Florida, where there was a 5-acre grass fire under a portion of a 400-acre PV facility that did not ignite any modules.[4]

Although unlikely, the greatest fire hazard at a utility-scale solar facility may be the oil in the transformer(s). The Project has two transformers, which are located near the center of the project. Traditionally these types of transformers have been filled with a mineral oil, which is derived from petroleum. The mineral oil is electrically insulating but flammable. These transformers are similar to transformers found throughout every community's shopping centers, schools, streets, factories, neighborhoods, etc. There are best practices for how to prepare for and conduct an emergency response at a transformer. For example, see the NERC "Lessons Learned" document in the Sources for Further Reading at the end of this section.

The Project has not yet determined if it will use mineral oil or vegetable oil in its transformer located in the PV array. Neither mineral oil- nor vegetable oil-filled transformers create a fire hazard for the community or property surrounding the solar facility because even in a worst-case scenario of a transformer fire, this equipment is located in the middle of a field, far from

[3] Matt Fountain. The Tribune. Fire breaks out at Topaz Solar Farm. July 2015. www.sanluisobispo.com/news/local/article39055539.html
[4] WBMM News 13, Fire breaks out at Jackson Co. solar farm. August 2022, www.youtube.com/watch?v=byE_BpUX2mc

other flammable materials. and far from neighboring properties. Typically, the only thing at risk of being ignited by a transformer fire in a utility-scalar facility is the groundcover (i.e. grass, clover, etc.), which is only a risk in particularly dry conditions. A grass fire is relatively easy to control and poses negligible fire risk to the community.

No special equipment is required to respond to a fire incident at a utility-scale PV facility. There are multiple electrical disconnect switches in PV systems which allows problem areas to be electrically isolated quickly, although first responders need to be aware that as long as the sun is shining on the PV panels they can produce dangerous voltage even if disconnected from the rest of the system. However, there is no danger in touching undamaged equipment. The International Association of Fire Fighters ("IAFF") provides online training on responding to fires at PV facilities at www.iaff.org/solar-pv-safety.

Additionally, first responders can safely extinguish grass fires inside of the facility, or monitor and protect the areas surrounding the facility to ensure the fire does not spread to surrounding areas. The solar facility owner remotely monitors the system around the clock and will coordinate with local first responders to ensure they have adequate access via a Knox Box in the case of an emergency. The Project has also coordinated with the Local Fire Protection District and offered to provide training following the Project's completion.

Sources for Further Reading on Fire and Emergency Response:

- Duke Energy: Fire Safety Guidelines for Rooftop- and Ground-Mounted Solar Photovoltaic (PV) Systems, Sept. 2015
- North American Electric Reliability Corporation (NERC): Lessons Learned, Substation Fires: Working with First Responders, February 2019

Toxicity (Equipment and Operations)

Toxicity is probably the most common health and safety concern with PV systems that members of the public have, although as detailed below, the systems do not pose a material toxicity risk to the public or the environment. This report examines all possible sources of toxicity, from site construction to decommissioning at the end of the project life. The potential sources of toxicity are organized into two categories: (1) equipment and (2) operations and maintenance (O&M).

Toxicity: Equipment

The main equipment within a solar facility is PV modules (a.k.a. solar panels or PV panels), metal structures for mounting the solar panels, and wiring to collect the electricity they produce. The other major components are inverters and transformers. Inverters are enclosed power electronic equipment that do not contain liquids and are treated like other electronic waste at the end of their life. Transformers contain non-toxic mineral oil or vegetable oil and are no different than the typical transformers outside of most residences, schools, and shopping centers. Solar panels have raised the most public concerns related to toxicity, so they are covered in depth below, and since transformers contain liquid they are also addressed below in detail. Other components in the facility include the steel racking, the conduits (PVC plastic and galvanized steel), and copper and aluminum wires. The conduit and wires are normal construction materials. The racking for the PV panels is generally galvanized steel posts with galvanized steel or aluminum cross members. None of these supporting materials (wire, conduit, and racking) create a toxicity concern. The galvanized coating on the steel is a zinc coating, and zinc is a vital mineral for human health. PVC plastic and galvanized steel conduits and all types of copper and aluminum wiring have been building staples for many decades. These same materials have not caused a toxicity concern in buildings where people are close to this equipment day and night.

Contents of PV Panels

The Project plans to use crystalline silicon PV panels from a Bloomberg Tier 1 manufacturer[5]. PV panels are the most expensive and most important component in a solar facility, so the project owner performs industry-standard due diligence to ensure that the panels selected and delivered to the project are properly manufactured, certified, and tested.

[5] The financial information firm Bloomberg has developed a tiering system for PV module makers based on bankability that is the standard the PV industry uses to differentiate between the hundreds of manufacturers of solar modules on the market. Tier 1 is the highest of three tiers, which are

The diagram below shows the components of a typical single-glass silicon PV panel, including a closeup of the solar cells and the electrical connections. Over 80% of the weight of a PV panel is the tempered front glass cover (or, front and back heat-strengthened glass) and the structural aluminum frame, which work together to create a strong, durable panel that outlasts its typical 25 to 35-year performance warranty. The encapsulation films are clear plastic lamination layers that protect the cells and electrical contacts from moisture for the life of the panel. These layers also maintain the panel as a single unit in the event of breakage of the glass cover(s), similar to the film in auto windshields that keeps them watertight and from fragmenting if the windshield shatters.

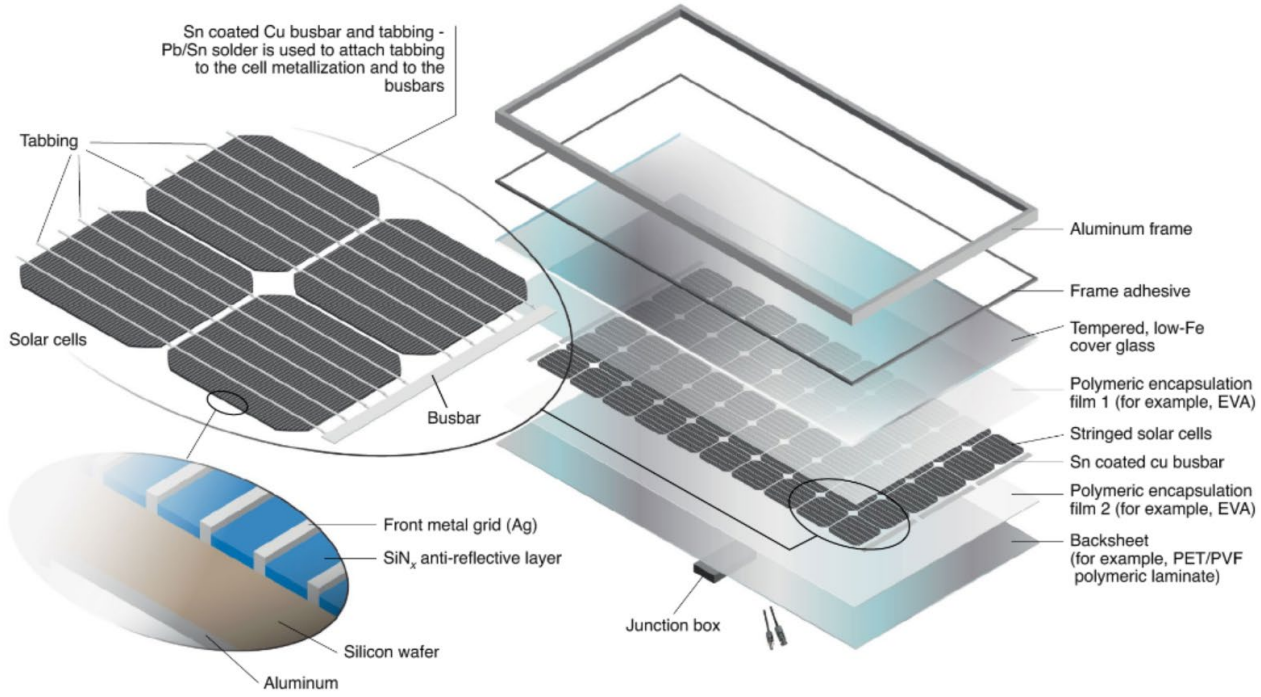


Figure 2. Contents of Framed Crystalline Silicon Panels (Source: NREL)

As can be seen in the above diagram, there are no liquids to leak from a broken panel. The plastic layers are inert. The silicon PV cells are nearly 100% silicon, which is harmless and is the second most common element in the Earth's crust. The only components of a PV panel that have any potential of toxic impact is the solder used to connect the solar cells together and to the busbars at the end of the panel, and the thin strips of silver that collect electricity from each cell.[6] The solder, which is the same tin-lead solder standard in the electronic industry, is 36% lead. The tiny amount of silver in a panel does not create a toxicity hazard, but does add potential recycling value.

Even though there is only a tiny amount of lead in each panel, it is reasonable to consider the total amount of lead in all the PV modules and put that in context with the amount of lead naturally occurring in soil. Across the US soils naturally have between about 10 and 50 mg of lead per kg of soil, with the average being somewhere in the 20s. Across the 88 USGA survey locations in IL, the values ranged from 15 to 76 mgs with an average of 26 and a median of 24 mg.[7] For a location that naturally has 20 mg of lead per kg of soil, all the lead in all the PV modules within the facility would have the same amount of lead as just the top 2.5 inches of soil at the site![8]

determined by banks' confidence in a manufacturer's PV panels as demonstrated by their willingness to supply project financing backed only by the assets of the project. The details are described by BloombergNEF in this document: PV Module Tier 1 List Methodology https://data.bloomberglp.com/bnef/sites/4/2012/12/bnef_2012-12-03_PVModuleTiering.pdf

[6] A detailed bill of materials for crystalline silicon PV modules is provided in Table 2 of the International Energy Agency (IEA) PVPS's report entitled: Life Cycle Inventories and Life Cycle Assessments of Photovoltaic Systems, December 2020 https://iea-pvps.org/wp-content/uploads/2020/12/IEA-PVPS-LCI-report-2020.pdf

[7] Smith, D.B., Cannon, W.F., Woodruff, L.G., Solano, Federico, Kilburn, J.E., and Fey, D.L., 2013, Geochemical and Mineralogical Data for Soils of the Conterminous United States: U.S. Geological Survey Data Series 801, 19 p., http://pubs.usgs.gov/ds/801/

[8] PV: 12 g of lead (per panel) per 65 ft^2 (panel footprint of 21.5 ft^2 / ground coverage ratio of 0.33) = 0.185 g of lead/ft^2

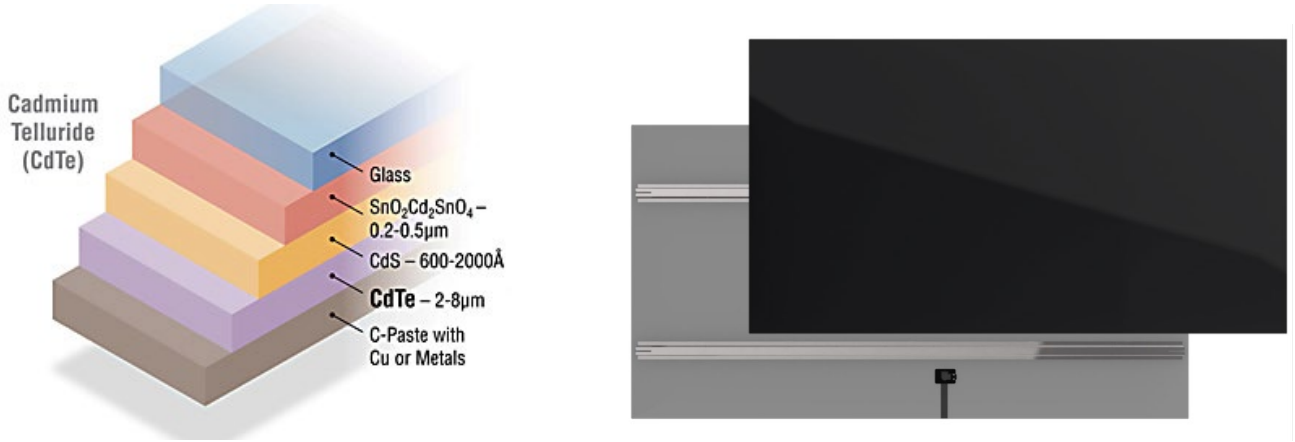


Figure 3. Contents of Cadmium Telluride Panels (Source: NREL); Front and Rear Photo of First Solar Series 7 CdTe Panels (Source: First Solar)

The leading alternative PV technology to silicon-based PV is cadmium telluride (CdTe), which is by far the most common thin film PV technology. **While the Project plans to use silicon modules and not use any CdTe modules, this assessment report is still providing a basic introduction to CdTe modules because it is not uncommon for stakeholders to have confusion about the differences in the two technologies.** CdTe is referred to as thin film because the active layers are less than 1/10th the thickness of a human hair. Figure 3 above contains two images, on the left is a not-to-scale diagram of the layers for a CdTe PV module (thickness dimension provided in image), and the right image is a photo of two First Solar CdTe modules showing the back of one module and the front of another. The PV cells consist of an incredibly thin layer of cadmium telluride with an even thinner coating of cadmium sulfide (roughly 1/60th the thickness of the CdTe film). Above these active layers is a transparent conducting metal oxide, commonly tin oxide (SnO_2), and below the active layers is a layer of metal to conduct away the electricity. This thin stack is sandwiched between two sheets of heat-strengthened glass that provides electrical insulation and physical protection. Like silicon modules there is no liquid to leak. The only aspect of CdTe modules that raises toxicity concern is the cadmium in the cadmium telluride and cadmium sulfide. Cadmium is a toxic heavy metal, but when cadmium is chemically bonded to tellurium in the crystalline cadmium telluride compound, it has only 1/100th toxicity to humans of cadmium on its own (i.e. not bonded to another element in a compound, also known as free cadmium).[9] The compound cadmium telluride is very stable, so it does not easily break down into cadmium and tellurium.

Cadmium telluride PV panels have been in use for decades, and their potential for creating a health hazard has been studied as long. As shown in the sections below and the some of the reading resources linked at the end of this section, CdTe panels are extremely safe and do not pose any risk to public health and safety, including when installed in large numbers.

Soil: 20 mg of lead per kg of soil * 45 kg of soil per ft^3 * 2.5 inches (0.208 ft) soil depth * 65 ft^2 = 12.17 g of lead / 65 ft^2 = 0.187 g of lead/ft^2

[9] C. Miller, I.M. Peters, and S. Zaveri, Thin Film CdTe Photovoltaics and the U.S. Energy Transition in 2020, https://qesst.org/resources/thin-film-pv-report-2020/, June 2020

Broken PV Panels

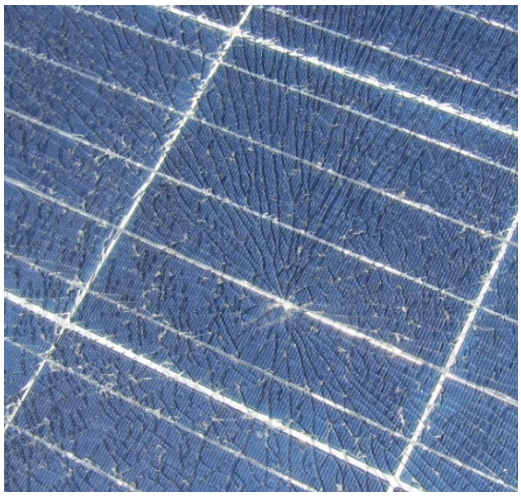


Figure 4. Close-up photo of impact point that broke the glass front of this PV panel

There is zero risk of toxicity escaping from undamaged PV panels because any lead or cadmium is sealed from air and water exposure. Individual panels damaged during the life of the solar facility are identified in days to months through either remote monitoring of system performance or from visual inspections during maintenance by onsite staff. In 2019, an international team of experts conducted an International Energy Agency (IEA) - Photovoltaic Power Systems Programme (PVPS) study to assess if there is a public health hazard caused by lead leaching from the broken silicon PV panels or cadmium leaching from cadmium telluride PV panels during the life of a utility-scale solar facility utilizing conservative assumptions to evaluate extreme scenarios.[10] The study examined worst-case exposure routes of soil, air, and ground water for a typical 100 MW_{AC} PV facility for both module types (crystalline and cadmium telluride). For example, the worst-case residential groundwater exposure assumed that all broken panels from the entire array were within 25 feet of the groundwater well, and the chemicals released from every broken panel transported to the same groundwater well. The study found that worst-case lead or cadmium exposure via air, soil, and water were each orders of magnitude less than the maximum levels defined by the EPA to have no adverse health effects. In the case of water, the health-screening level used in the analysis is the same as the maximum concentration level (MCL) set by the EPA for water quality in public water systems. This study demonstrates that there is no risk to public health from lead or cadmium leached from broken PV panels.

PFAS

Some solar opponents have raised questions about the possibility of per- and poly-fluoroalkyl substances ("PFAS") chemicals being emitted by solar panels. PFAS chemicals are a group of man-made chemicals informally known as "forever chemicals" due to their durability in the environment. These chemicals have been used in many industrial and consumer products for over 60 years, including food packaging materials, firefighting foam, waterproof clothing, and stain resistant carpet treatments.

As explained in a fact sheet from the University of Michigan entitled "Facts about solar panels: PFAS contamination", PV panels do not contain PFAS materials.[11] Neither the self-cleaning coating on top of the solar panel, the adhesives in the panel, nor the front or rear covers/substrates contain PFAS. The "backsheet", or traditional rear substrate of a silicon PV panel, is the thin plastic layer on the rear of a single-glass PV panel that provides electrical insulation and physical protection for the rear of the PV cells. Polyvinyl fluoride (PVF) is the base material for the most common backsheet material (Tedlar), but several other materials have also been used as backsheets, some consisting of multiple layers. Depending on which definition of PFAS that is used, PVF may be classified as PFAS, however the most recent and applicable definition of what is and is not a PFAS material was created by the Organization for Economic Co-operation and Development (OECD)[12] in 2021 and PVF does not meet this modern PFAS definition[13].

[10] P. Sinha, G. Heath, A. Wade, K. Komoto, 2019, Human health risk assessment methods for PV, Part 2: Breakage risks, International Energy Agency (IEA) PVPS Task 12, Report T12-15:2019. ISBN 978-3-906042-87-9, September 2019

[11] "Clean Energy in Michigan" Series, Number 12, Facts about solar panels: PFAS contamination, By Dr. Annick Anctil, https://graham.umich.edu/media/pubs/Facts-about-solar-panels--PFAS-contamination-47485.pdf

[12] OECD is an intergovernmental organization with representatives of 38 industrialized countries. OCED developed the updated definition in response to an international call for "programmes and regulatory approaches to reduce emissions and the content of relevant perfluorinated chemicals of concern in products and to work toward global elimination, where appropriate and technically feasible." OECD Portal on Per and Poly Fluorinated Chemicals: www.oecd.org/chemicalsafety/portal-perfluorinated-chemicals/

[13] OECD (2021), Reconciling Terminology of the Universe of Per- and Polyfluoroalkyl Substances: Recommendations and Practical Guidance, OECD Series on Risk Management, No. 61, OECD Publishing, Paris. www.oecd.org/chemicalsafety/portal-perfluorinated-chemicals/terminology-per-and-polyfluoroalkyl-substances.pdf

PV Panel End-of-Life

PV panels last a very long time, but they do not last forever. The expected economic life of utility-scale PV panels is 25-40 years, at which point they may be replaced by new panels or the entire project may be decommissioned in accordance with state requirements. At a typical solar facility, there are three possible fates for solar panels at the end of their economic life at a project, described below. The facility owners will be required to handle and dispose of the equipment in conformance with federal, state, and local requirements. The Project has prepared a decommissioning plan governing this process. **In compliance with state & Kane County requirements, the project will provide the county with a decommissioning bond to cover decommissioning costs.**

Reuse: It is most likely that when the PV panels at the Plato Road Solar project are decommissioned, they will still be able to produce approximately 80% of their original output. These panels could be reused on rooftops or ground-mounted applications.

Figure 5. PV Panels Waiting to be Recycled (Source: LuxChemtech GmbH)

Recycling: Any panels that are not reused as working panels could be recycled. Currently in the US it is possible to recycle the largest constituents of PV panels using the existing glass and metal recycling infrastructure. Today this recycling comes at a cost premium to disposing the panels in a landfill. However, as PV recycling technology improves and the number of panels reaching end-of-life increases dramatically, it is possible that in the future recycling PV panels will more than pay for itself. Recycling plants built specifically to recycle PV panels can recycle nearly 100% of the panel, including the valuable silver and refined silicon they contain, and can be optimized for the task, significantly reducing the cost to recycle each panel. In 2018 the first industrial-scale PV-specific recycling plant was built, in France, and in 2022 the first large scale PV recycling plant in the US was built. These initial PV recycling plants will not have the capacity to recycle the millions of installed PV panels, but in the coming decades it is expected that PV-specific recycling plants will become much more commonplace. It is expected that when the Project's PV panels reach the end of their useful life in 30+ years, the US PV recycling infrastructure will be robust, such that reuse or recycling of the PV panels will be the preferred options or required by new U.S. regulations, as it has been for years in Europe.

The Solar Energy Industries Association (SEIA) started the SEIA National PV Recycling Program several years ago at accelerate PV recycling in the US. Currently the program aggregates the services offered by recycling vendors and PV manufacturers, making it easier for the industry to select a cost-effective and environmentally responsible end-of-life management solution. **The program identifies Preferred Recycling Partners through an evaluation process. These partners are capable of recycling PV modules, inverters, and other related equipment today**. The current SEIA PV Recycling Partners are listed on the program's website, and full access to the program and the Preferred Recycling Partners is available to SEIA members.

Disposal: For most solar facilities, if panels are not reused or recycled, federal waste management laws (Resource Recovery and Conservation Act, RCRA) require that PV panels, like any other commercial/industrial waste, be disposed of properly, which is typically in a landfill. In order to determine the proper disposal method, RCRA requires that all commercial/industrial waste be identified as either hazardous or non-hazardous waste, which is generally determined using the Toxic Characteristic Leaching Procedure (TCLP) test developed by the U.S. EPA. This test seeks to simulate landfill conditions and check for leaching of 8 toxic metals and 32 organic compounds. Little data has been published about the TCLP test results of solar panels, but it is known that some older silicon panels that contain more lead than modern panels exceed the TCLP test limits for lead. Researchers at Arizona State University's Photovoltaic Reliability Laboratory have conducted a robust investigation of methods for conducting accurate TCLP tests on PV panels, and their

latest research found that all three of the crystalline silicon PV panels tested passed the TCLP test, classifying them as non-hazardous waste.[14]

A recent IEA-PVS study on PV panel disposal risks of improper disposal in non-sanitary landfill evaluated the potential for cancer and non-cancer hazards by comparing predicted exposure-point concentrations in soil, air, groundwater, and surface water with risk-based screening levels created by the EPA and the World Health Organization (WHO).[15] One of the report's authors, Gavin Heath with the US Department of Energy's National Renewable Energy Laboratory (NREL), summarized their findings about lead in silicon PV panels this way: "under the worst-case conditions, none of them exceeded health-screening thresholds, meaning they're not deemed to potentially have significant enough risk that you'd want to do a more detailed health risk assessment."[16] The worst-case scenario defined in the research has many conservative assumptions, and thus likely overestimates the risk of disposal in a *non-sanitary* landfill. It is important to stress that Illinois only allows solid waste disposal in sanitary landfills, which are engineered facilities with plastic liners, leachate collection systems, and covers, all of which dramatically reduce the potential for human exposure compared to non-sanitary landfills. **This and other research show that if the Project PV panels are disposed of in a landfill, as opposed to be repurposed or recycled, they will not create any negative public health impact.**

Transformer Oil

While PV modules and inverters do not have any liquids that could leak into the environment, the inverter step-up (ISU) transformers located with the inverters contain oil. Several types of oil can be used in transformers to provide the needed electrical insulation and cooling, but the most common type of transformer oil is mineral oil, which has been used in transformers since transformers were first manufactured in the 1890s. Ongoing monitoring of transformer temperature and pressure, and regular preventative maintenance is key to quickly identifying and addressing leaks.

Figure 6. 3.2 MVA Inverter Step-up Transformer containing 575 gallons of oil

There was a time when most transformer oil was toxic. From 1929 to 1977 polychlorinated biphenyls (PCBs), a man-made alternative to mineral oil, was commonly used as transformer oil instead of mineral oil. However, the toxicity of PCBs was eventually understood, leading to PCBs being banned in the US in 1979. Today, transformers either use mineral oil or vegetable oil, both of which are free of PCBs. Mineral oil is non-toxic to humans, in fact "baby oil" that is used to soothe babys' skin is a scented mineral oil. Although non-toxic to humans, mineral oil is an environmental contaminate and harmful to aquatic ecosystems, so any release to the environment should be avoided. The potential for negative environmental impact from spilled vegetable oil is much less because these oils are biodegradable, so the time they impact the environment is short-lived. Federal regulations dating back to the Clean Water Act of 1973 require that facilities with significant quantities of oil to prevent pollution of water.[17] The current EPA regulations require that facilities with over 1,320 gallons oil, and with the potential for spilled oil to impact surface water, must develop and implement an oil spill prevention, control and countermeasure (SPCC) plan. While the risk of negative environmental impact from a transformer oil spill/leak cannot be eliminated entirely, these regulations along with standard industry practices, result in a low probability for a substantial spill and a high probability for a quick clean-up response to minimize impact if a spill were to ever occur.

[14] Tamizhmani, G., et al. (2019). Assessing Variability in Toxicity Testing of PV Modules. In 2019 IEEE 46th Photovoltaic Specialists Conference (pp. 2475-2481). https://doi.org/10.1109/PVSC40753.2019.8980781 Publicly-accessible version: https://dev-pvreliability.ws.asu.edu/sites/default/files/93_assessing_variability_in_toxicity_testing_of_pv_modules.pdf

[15] P. Sinha, G. Heath, A. Wade, K. Komoto, Human health risk assessment methods for PV, Part 3: Module disposal risks, International Energy Agency (IEA) PVPS Task 12, Report T12-16:2020. ISBN 978-3-906042-96-1, May 2020

[16] Green Tech Media, Landfilling Old Solar Panels Likely Safe for Humans, New Research Suggests, April 2020, www.greentechmedia.com/articles/read/solar-panel-landfill-deemed-safe-as-recycling-options-grow

[17] Environmental Protection Agency, webpage: Overview of the Spill Prevention, Control, and Countermeasure (SPCC) Regulation, www.epa.gov/oil-spills-prevention-and-preparedness-regulations/overview-spill-prevention-control-and

Toxicity: Operations & Maintenance

Unlike most other electricity generation facilities, photovoltaic systems do not produce any emissions. The only way they could produce emissions is in the unlikely event of a fire. The potential human health impacts from contact with smoke from burning PV panels was studied by the International Energy Agency (IEA) PVPS in their first report on human health risk assessment. In that study they did not study ground-mounted PV, presumably because of the extremely low risk of significant fire, but they did investigate the potential health impacts of lead in silicon modules dispersing in smoke from a fire in a building that is covered in PV modules. The study considered several worst-case scenarios for different size buildings and different environments and found no risk of harmful health impacts from the smoke from PV panels.[18]

The only other two aspects of operations and maintenance (O&M) that have raised concerns about toxicity are the fluids used to wash panels and vegetation management techniques.

- **Panel Washing** – Across IL there is ample rain to keep the panels clean. If the panels need to be washed, it would occur infrequently and typically with use of deionized water and cleaning brushes.
- **Vegetation Management –** The typical industry practice for maintaining the vegetation at solar facilities is similar to how most cities maintain their parks, which is they primarily rely on mowing and string trimmers for vegetation and use herbicides along fences, on roads, and under some equipment. Often parks and solar facilities also use herbicides to strategically remove problem weeds, especially woody weeds, to maintain a healthy cover of the desired species of grasses and other low-growing vegetation. This mode of herbicide use applies significantly less than the herbicide volume commonly applied in most modern agriculture. The Project plans to only use herbicides after other management methods have been fully exhausted, in which case the project prefers use of biodegradable herbicides. All herbicides must be registered/licensed by the US EPA and used according to the product's instructions.

Sources for Further Reading on Toxicity:

- QESST (Engineering Research Center at Arizona State University): Thin Film CdTe Photovoltaics and the U.S. Energy Transition in 2020, June 2020
- International Renewable Energy Agency (IRENA): End-of-life management: Solar Photovoltaic Panels, June 2016
- Electric Power Research Institute (EPRI): Solar PV Module End of Life: Options and Knowledge Gaps for Utility-Scale Plants, December 2018
- EPRI: Feasibility Study on Photovoltaic Module Recycling in the United States, April 2018
- EPRI: Solar Photovoltaics: End-of-Life Management Infographic, March 2021
- National Renewable Energy Laboratory (NREL): A Circular Economy for Solar Photovoltaic System Materials, April 2021
- Solar Energy Industries Association (SEIA): SEIA National PV Recycling Program, with factsheet, checklist, and peer-reviewed article, (accessed December 2021)
- North Carolina Department of Environmental Quality: Final Report on the Activities Conducted to Establish a Regulatory Program for the Management and Decommissioning of Renewable Energy Equipment, January 2021
- South Carolina Department of Health and Environmental Control: Final Report on the Activities Conducted to Establish a Program for End-of-Life Management of Photovoltaic Modules and Energy Storage Systems, June 2022

[18] P. Sinha, G. Heath, A. Wade, K. Komoto, 2018, Human Health Risk Assessment Methods for PV, Part 1: Fire risks, International Energy Agency (IEA) PVPS Task 12, Report T12-14:2018, https://iea-pvps.org/wp-content/uploads/2020/01/HHRA_Methods_for_PV_Part1_by_Task_12.pdf

Electromagnetic Fields (EMF)

Exposure to EMF, or electric and magnetic fields, is an unavoidable part of everyday modern life. Electromagnetic fields come in many different frequencies, ranging from grid electricity with a frequency of 60 hertz to x-rays and gamma rays that are billions of billions of times faster. The faster the frequency, the stronger the EMF. The EMF coming from grid electricity, including from the inverters, transformers, and AC wires to be used at the Project has a much lower frequency (and therefore much lower energy) than the EMF from cell phones, wireless internet, and even radio and TV towers. The solar panels and the wire connecting them to the inverters carry direct current electricity, which has a frequency of zero hertz, and thus produces static electric and magnetic fields. The voltage and current of these circuits are both relatively low, so the electric and magnetic fields they produce are both rather weak. The static magnetic fields the panels generate are much weaker than the earth's natural static magnetic field, which can be demonstrated by a compass still pointing north when placed near the panels.

Electric fields are created around wires and equipment wherever a voltage exists, however it is easily blocked with common materials such as metal, wood, and soil. The 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. [19] This frequency range includes both grid electricity that operates at 60 Hz and the PV panels that operate at 0 Hz. The proposed solar project does not produce any voltages higher than the voltage of the existing power lines, and therefore does not produce any electric fields not generally encountered by members of the public.

Magnetic fields are the other aspect of EMF, and they are created by electric current. Typical Americans are exposed to about 1 milligauss of magnetic field from grid electricity (60 Hz) on average during their day, primarily from sources at homes and work[20]. The primary source of magnetic fields in a solar facility are the inverters and the short section of wires between each central inverter and its step-up transformer, or in the case of string inverters, the short section of wire between the AC combiner and the step-up transformer. To convert direct current to alternating current, inverters use a series of solid-state switches that turn off and on several thousand times a second, creating EMF in the range of 5 kHz to 100 kHz, which is much faster than the 60 Hz of grid electricity but still much slower than even the lowest frequency radio signals. The highest electrical current of any portion of the solar facility occurs where the output from all the string inverters are combined together at the ISU transformers. The strength of the magnetic fields generated is a function of the amount of AC current, because changes in current is what creates the magnetic fields, and the amount of current determines how strong the magnetic fields will be.

With increasing distances from the equipment, the EMF attenuates with approximately the cube of the distance, so when the distance triples the EMF reduces by a factor of 27 (3^3). The Author developed some conservative calculations to estimate EMF from the inverters based on the EMF measurements from available reports of EMF near PV equipment[21, 22] and adjusting for modern inverters (higher voltages and lower current per kW). Using these calculations, the magnetic fields from a single 125 kW inverter would drop to background levels (<0.2 mG) within 25 feet of the inverter. Based on the initial plan set submitted by the Project to Kane County, dated August 25, 2023, the closest inverter to the neighboring school is over 110 feet from the property boundary and the closest inverter to a neighboring house is over 200 feet from the property boundary. The highest AC current anywhere in the PV project, and thus the strongest source of magnetic fields, is where the output from 20 inverters combine to go into each of the two 2.5 MVA transformers. From this location at the low voltage side of the step-up transformer, the EMF would extend less than 100 feet from each transformer before attenuating to

[19] WHO factsheet: Electromagnetic fields and public health, Exposure to extremely low frequency fields, June 2007, http://www.who.int/teams/environment-climate-change-and-health/radiation-and-health/non-ionizing/exposure-to-extremely-low-frequency-field
[20] World Health Organization (WHO), webpage: Electromagnetic Fields – Typical exposure levels at home and in the environment, www.who.int/peh-emf/about/WhatisEMF/en/index3.html
[21] Study of Acoustic and EMF Levels from Solar Photovoltaic Projects. Tech Environmental, Inc., December 2012, https://www.masscec.com/resources/study-acoustic-and-emf-levels-solar-photovoltaic-projects
[22] EPRI technical report, Electric and Magnetic Field Exposure Levels (0 to 3 GHz) in Occupational Environments near Photovoltaic Energy Generation Facilities, November 2012, https://www.epri.com/research/products/1023797

background levels (<0.2 mG).

In summary, EMF from the Plato Road Solar project will not increase the EMF exposure of any neighbors or students. Even if some EMF from the PV facility were to extend beyond the PV site, which the provided calculations show otherwise, there would still be no public health impact because low levels of low frequency EMF exposure is not harmful to humans. After extensive study of the potential health impacts of EMF from grid electricity the WHO concluded that *"Despite extensive research, to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health."*[23]

Sources for Further Reading on EMF:

- Electric Power Research Institute: EMF and Your Health: 2019 Update, December 2019
- World Health Organization: Electromagnetic Fields (accessed September 2022)

Glare

Photovoltaic panels are designed to absorb, and thus not reflect, the solar energy that they receive. However, when sunlight strikes the glass front of a solar panel at a glancing angle, a significant portion of the solar radiation is reflected, which can potentially lead to solar glint (a brief flash) or glare. Glint or glare can temporarily impact a person's vision, including pilots landing aircraft, or motorists driving vehicles. However, the conditions required for a PV project to create glare rarely occur.

PV facilities, such as the Project, that utilize single axis trackers to slowly rotate the solar panels to follow the sun have even less potential to create glare because the trackers help avoid a situation where sunlight hits the panels at a glancing angle. Most modern trackers implement an advanced control strategy known as "backtracking" that increases the electricity production of the site by flattening the tilt of the panels early and late in the day to keep the rows of solar panels from shading one another. Backtracking can result in brief periods near sunrise and sunset where the sun strikes the panels at a glancing angle, creating a situation that could result in a few minutes of visible glare at sunrise and sunset. For anyone to see this glare they must be looking across the solar panels in the direction of the rising or setting sun, which is a situation where the sun obviously will create significant glare for the viewer with or without the solar project.

A clear indication of the ability to avoid glare problems from large ground-mounted PV systems are the PV systems installed on airports across the U.S., including Denver International and Indianapolis International. While there is the potential for a PV system to create glare, there is also the ability to predict when and where a system may create glare and incorporate any needed mitigation before construction. The Federal Aviation Administration (FAA) and the U.S. Department of Energy (DOE) developed specialized solar glare analysis software to predict when and where a PV project may produce glint or glare for sensitive receptors nearby. That original software technology has been licensed to a 3rd firm (Forge Solar) that continues to improve and refine the software, which has been validated to accurately predict solar glare.

Figure 7. 20 MW PV System at Indianapolis International Airport (Photo source: inhabitat.com)

[23] World Health Organization (WHO), webpage: Electromagnetic Fields – Summary of health effects, www.who.int/peh-emf/about/WhatisEMF/en/index1.html

In May of 2021, the FAA replaced the long-standing interim solar glare policy with a (final) policy that no longer restricts solar developed on airport property from creating glare visible to pilots. The policy explains that the new acceptance of glare visible to pilots is in recognition that pilots often experience glare during landing from bodies of water and that glare from solar is not meaningfully different.[24] The new policy does still prohibit on-airport PV systems from creating any glare visible in an air traffic control tower. While the FAA policy only applies to PV developed on airport property, it is reasonable to follow the same policy for PV plants sited near airport property.

The closest airport in the National Plan of Integrated Airport Systems (NPIAS)[25] is the DuPage Airport (DPA) approximately 14 miles southeast of the closest solar panel. Although this airport does have an air traffic control tower, it is too far away for the proposed site to have any potential to create glare visible to the air traffic controllers at the airport, and as noted above the only glare concern that the FAA enforces for PV under their jurisdiction is glare visible at the air traffic control tower. The Project has consulted with the FAA, who has provided a Determination of No Hazard to Air Navigation, dated August 7, 2023, in accordance with federal requirements.

It is also possible for utility-scale PV facilities to cause brief periods of glare visible to motorists driving on nearby roads. However, like pilots, motorists are accustomed to occasionally seeing glare near the rising or setting sun, both from the sun itself and from reflection off flat objects such as a body of water or the windows of a vehicle or building, and motorists regularly adjust safely to this visual challenge. A PV array with backtracking trackers can cause glare in a few locations very close to sunrise and sunset during a few months of the year, however the time and location of any potential for glare can be accurately predicted with solar glare analysis software. The Plato Road Solar project will be surrounded by a combination of extensive existing-vegetation buffer and significant new planted vegetative buffer that will block most of motorists' view of any solar panels and any potential glare. Considering the extensive vegetative buffers, the project is not expected to create significant glare for any motorists. If small amounts of glare are visible, it would not create a hazard just like glare visible to landing pilots does not create a hazard.

Sources for Further Reading on Solar Glare:

- National Renewable Energy Laboratory (NREL): Research and Analysis Demonstrate the Lack of Impacts of Glare from Photovoltaic Modules, July 2018
- ForgeSolar: PV Planning and glare analysis software help documentation, (accessed September 2022)

Conclusions

Based on my knowledge of science, personal experience with PV technology, review of academic research, and review of materials provided by the project developers about the proposed Plato Road Solar PV facility in Kane County, Illinois, my opinions are summarized as follows:

- The Plato Road Solar project will result in a significant reduction of regional air pollution.
- The Plato Road Solar project will not negatively impact public health and safety.

[24] "Federal Aviation Administration Policy: Review of Solar Energy System Projects on Federally-Obligated Airports", https://www.federalregister.gov/documents/2021/05/11/2021-09862/federal-aviation-administration-policy-review-of-solar-energy-system-projects-on-federally-obligated

[25] The National Plan of Integrated Airport Systems (NPIAS) identifies nearly 3,310 existing and proposed airports that are included in the national airport system. The NPIAS contains all commercial service airports, all reliever airports, and selected public-owned general aviation airports. www.faa.gov/airports/planning_capacity/npias

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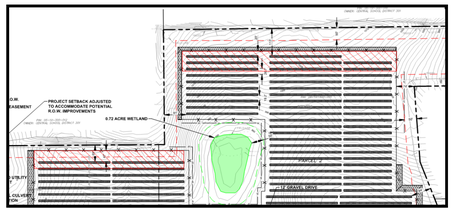
EXHIBIT C

VIEW OF TRACKERS FROM REV. 1 REMOVED FROM HATCHED AREAS



TRACKERS REMOVED FROM THESE AREAS

POTENTIAL FUTURE R.O.W.

POTENTIAL UTILITY EASEMENT

PROJECT SETBACK ADJUSTED TO ACCOMMODATE POTENTIAL R.O.W. IMPROVEMENTS

0.72 ACRE WETLAND

1.2 ACRE WETLAND

0.14 ACRE WETLAND

0.20 ACRE WETLAND

POI

POLE MOUNTED UTILITY AC DISCONNECT

POTENTIAL CULVERT INSTALLATION

PROVIDE STABILIZED CONSTRUCTION ENTRANCE DURING CONSTRUCTION

POLE-MOUNTED UTILITY RECLOSER

POLE MOUNTED PRIMARY METER

POLE MOUNTED CUSTOMER RECLOSER

LARGER STONE AT LOW CROSSING

0.62 AC. PERMANENT VEGETATION BMP TO BE SEEDED AND MAINTAINED AS SOLAR FARM SEED MIX IN ACCORDANCE WITH LANDSCAPING DETAILS

HAY BALE DITCH CHECK

PARCEL 2

12' GRAVEL DRIVE

SITE BENCHMARK #1
ELEV.=1019.84'

SITE BENCHMARK #2
ELEV.=981.42'

SITE BENCHMARK #3
ELEV.=967.84'

PIN: 05-19-300-016
OWNER: CENTRAL SCHOOL DISTRICT 301

PIN: 05-19-300-012
OWNER: CENTRAL SCHOOL DISTRICT 301

PIN: 05-19-300-009
OWNER: PELOQUIN, GREGORY J & LYNNE A

PIN: 04-24-400-027
OWNER: PELOQUIN, GREGORY J & LYNNE A

PIN: 04-24-400-023
OWNER: PJ HOLDINGS TRUST

PIN: 04-24-400-014
OWNER: SIMS, SYLVIA J

PIN: 04-24-400-029
OWNER: TEETS, EARL G JR & SHARON

PIN: 04-24-400-030
OWNER: HERRMANN, ALBERT H & SHARON S TRUST

PLATO-HOMD

BURLINGTON ROAD

ELLITHORPE ROAD

NOTE

EXISTING FEATURES LEGEND

- PROPERTY LINE
- CENTER LINE
- EASEMENT LINE
- BUILDING SETBACK
- SECTION LINE
- RECORD DATA (XXX')
- SPOT GRADE (TOP OF CURB/FULL DTC / BOTTOM OF GRD/ANC. GUTR/ELETC.) XXX.XX / XXX.XX
- CONCRETE
- EVERGREEN/DECIDUOUS WITH SIZE IN INCHES
- SHRUB/SHRUB LINE
- MONITOR WELL
- GAS VALVE
- UTILITY MARKINGS (cable,elec,fiber) (tel,water,gas)
- SOIL BORING
- TELEPHONE MANHOLE
- HANDRAIL
- GUARDRAIL
- GUY WIRE ANCHOR
- CONTOUR LINE
- EDGE GRAVEL/STONE
- FENCE LINE
- FLARED END SECTION
- STORM SEWER
- SANITARY SEWER
- COMBO SEWER
- WATER SERVICE LINE
- WATER MAIN
- OVERHEAD LINE
- FIBER OPTIC LINE
- GAS LINE
- U.G. TELCO LINE
- U.G. ELECTRIC LINE
- EXISTING TREELINE
- UTILITY POLE
- TYPICAL SIGN
- MAILBOX
- CLOSED MANHOLE
- OPEN GRATE MANHOLE
- BEEHIVE GRATE MANHOLE
- GUTTER FRAME MANHOLE
- VALVE VAULT
- FIRE HYDRANT
- B-BOX / SERVICE VALVE
- POST LIGHT/GROUND LIGHT
- AREA LIGHT/LIGHT POLE
- STREET LIGHT
- TRAFFIC SIGNAL
- MAST ARM SIGNAL
- HANDHOLE (electric/traffic)
- GAS METER
- ELECTRIC METER
- PEDESTAL(telco,elec,cable)
- EXISTING STREAM/POND
- WETLAND SETBACK
- CROP LINE
- EXISTING BUILDING
- STEEP SLOPES
- PSS WETLAND
- PEM WETLAND
- PEM/PSS MOSAIC WETLAND
- GRASS AND WEEDS
- LOW AREAS WITH STANDING WATER POTENTIAL

PROPOSED FEATURES LEGEND

- FENCE LINE
- SILT FENCE
- MV CABLE
- OVERHEAD LINE
- CONTOUR LINE
- GRAVEL ACCESS ROAD
- ATI 78 MODULE TRACKER ROW
- ATI 52 MODULE TRACKER ROW
- POWER STATION - (1) MV TRANSFORMER, (1) DAS, (1) WEATHER STATION
- VEGETATIVE LANDSCAPING SCREENING

NOTES

1. ACCESS ROADS SHALL BE DESIGNED TO ACCOMMODATE ALL CONSTRUCTION, OPERATIONS, MAINTENANCE, AND EMERGENCY TRAFFIC.
2. NO LIGHTING IS PROPOSED.
3. THERE IS NO EXPECTED TREE CLEARING
4. VEHICLE GATE IS SHOWN. ADDITIONAL PEDESTRIAN ACCESS GATES MAY BE ADDED.
5. THE TOTAL HYDROLOGICALLY DISTURBED AREA IS 0.48 ACRES (THE AREA OF IMPERVIOUS SURFACE). THE HYDROLOGICALLY DISTURBED AREA IS LIMITED TO THE DISTURBED AREAS WHERE RUNOFF RATE OR VOLUME IS INCREASED OR DIRECTION IS ALTERED.
6. THE LAND BENEATH THE PV TRACKERS WILL BE RE-VEGETATED AS INDICATED ON THE LANDSCAPE PLANS AND IS NOT CONSIDERED HYDROLOGICALLY DISTURBED.
7. THE CONCRETE WASHOUT AREA WILL BE TEMPORARY AND WILL NOT CONTRIBUTE TO THE IMPERVIOUS SURFACE AREA.

0 120 240 360 480
SCALE IN FEET

NOT FOR CONSTRUCTION

SEAL:

PROFESSIONAL ENGINEER:
ANDREW B. GRAHAM
062048682

EXPIRATION DATE:
11/30/23

TRC ENVIRONMENTAL CORP.
DESIGN FIRM LIC. # 184004960002

NO.	BY	DATE	REVISION	APP'D.
1A	AG	11/08/2023	ISSUED FOR PERMIT	ABG
1	CC	08/02/2023	ISSUED FOR PERMIT	ABG

PROJECT:
PERMIT PLAN SET
RPIL SOLAR 8, LLC
PLATO ROAD SOLAR
KANE COUNTY, IL

TITLE:
SITE PLAN

DRAWN BY:	E. ALEXANDER	PROJ. NO.:	500015.0000.0006
CHECKED BY:	C. CAMERON		
APPROVED BY:	A.GRAHAM		C100
DATE:	NOVEMBER 2023		

TRC
230 West Monroe St.
Suite1840
Chicago, IL 60606
Phone: 312.578.0870

FILE NO.: 500015.0000.0006 C100 Site Plan.dwg

GENERAL LANDSCAPE AND SEEDING NOTES

1. THE LANDSCAPE PLAN AND DETAILS ARE FOR LANDSCAPING INFORMATION ONLY. PLEASE REFER TO THE SITE LAYOUT PLAN, GRADING PLAN AND/OR UTILITIES PLAN FOR ALL OTHER INFORMATION.

2. THE CONTRACTOR SHALL MONITOR AND GUARANTEE THAT ALL PLANTS, TREES, AND SHRUBS SHALL BE HEALTHY AND FREE OF DISEASE FOR A PERIOD OF (1) ONE YEAR AFTER SUBSTANTIAL COMPLETION AND ACCEPTANCE BY THE OWNER. CONTRACTOR SHALL REPLACE ANY DEAD OR UNHEALTHY PLANTS AT CONTRACTOR'S EXPENSE. FINAL ACCEPTANCE SHALL BE MADE IF ALL PLANTS MEET THE GUARANTEE REQUIREMENTS INCLUDING MAINTENANCE. MAINTENANCE RESPONSIBILITIES INCLUDE INVASIVE SPECIES MONITORING, REMOVAL, AND SUPPLEMENTATION. MONITORING OF THE PROJECT SITE SHALL OCCUR IN THE SPRING AND THE FALL TO DETERMINE THE PRESENCE OF INVASIVE SPECIES. SHOULD ANY INVASIVE SPECIES BE IDENTIFIED WITHIN THE PROJECT SITE, THE INVASIVE SPECIES SHALL BE REMOVED ACCORDING TO METHODS MOST LIKELY TO BE EFFECTIVE IN CONTROLLING THAT SPECIES AND SUPPLEMENTING ITS REPLACEMENT WITH APPROPRIATE VEGETATION AND SEED MIX IDENTIFIED (AND APPROVED) ON THIS PLAN AND/OR AN APPROVED EQUAL. ADDITIONAL MAINTENANCE RESPONSIBILITIES INCLUDE: APPROVED CULTIVATING, SPRAYING, WEEDING, WATERING, TIGHTENING OF TREE STRAP GUYS, PRUNING, FERTILIZING, MULCHING, AND ANY OTHER OPERATIONS NECESSARY TO MAINTAIN PLANT VIABILITY. MAINTENANCE SHALL BEGIN IMMEDIATELY AFTER PLANTING AND CONTINUE UNTIL 90 DAYS AFTER FINAL ACCEPTANCE.

3. THE CONTRACTOR SHALL SUPPLY ALL LABOR, PLANTS, APPROVED SEEDING MIX, AND MATERIALS IN QUANTITIES SUFFICIENT TO COMPLETE THE WORK SHOWN ON THE DRAWING(S) AND LISTED IN THE PLANT SCHEDULE(S) AND/OR SEEDING TABLE(S). IN THE EVENT OF A DISCREPANCY BETWEEN QUANTITIES SHOWN IN THE PLANT SCHEDULE AND/OR SEEDING TABLE AND THOSE REQUIRED BY THE DRAWINGS, THE LARGER SHALL APPLY. ALL PLANTS SHALL BE ACCLIMATED BY THE SUPPLY NURSERY TO THE LOCAL HARDINESS ZONE AND BE CERTIFIED THAT THE PLANTING MATERIAL HAS BEEN GROWN FOR A MINIMUM OF (2) TWO YEARS AT THE SOURCE AND OBTAINED WITHIN 200 MILES OF PROJECT SITE UNLESS OTHERWISE APPROVED BY OWNER, CERTIFIED LANDSCAPE INSPECTOR, OR LANDSCAPE ARCHITECT.

4. THE LOCATIONS FOR PLANT MATERIAL ARE APPROXIMATE AND ARE SUBJECT TO FIELD ADJUSTMENT DUE TO SLOPE, VEGETATION, AND SITE FACTORS SUCH AS THE LOCATION OF ROCK OUTCROPS. PRIOR TO PLANTING THE CONTRACTOR SHALL ACCURATELY STAKE OUT THE LOCATIONS FOR ALL PLANTS. THE OWNER, CERTIFIED LANDSCAPE INSPECTOR, OR LANDSCAPE ARCHITECT SHALL APPROVE THE FIELD LOCATIONS OR ADJUSTMENTS OF THE PLANT MATERIAL.

5. ALL SHRUB MASSING AREAS SHALL BE MULCHED TO A DEPTH OF 2" WITH SHREDDED HARDWOOD BARK MULCH.

6. NO PLANT SHALL BE PLACED IN THE GROUND BEFORE ROUGH GRADING HAS BEEN COMPLETED AND APPROVED BY THE OWNER, CERTIFIED LANDSCAPE INSPECTOR, OR LANDSCAPE CONTRACTOR. STAKING THE LOCATION OF ALL TREES AND SHRUBS SHALL BE COMPLETED PRIOR TO PLANTING FOR APPROVAL BY THE OWNER, CERTIFIED LANDSCAPE INSPECTOR, OR LANDSCAPE ARCHITECT. STAKING OF THE INSTALLED TREE MUST BE COMPLETED THE SAME DAY AS IT IS INSTALLED. ALL TREES SHALL BE STAKED OR GUYED AS PER THE DETAIL. SEE LANDSCAPING PLAN(S) FOR PLANTING DETAILS.

7. COORDINATE PLANT MATERIAL LOCATIONS WITH SITE UTILITIES. SEE SITE LAYOUT, GRADING AND/OR UTILITY PLANS FOR STORM, SANITARY, GAS, ELECTRIC, TELEPHONE AND WATER LINES. UTILITY LOCATIONS ARE APPROXIMATE. EXERCISE CARE WHEN DIGGING IN AREAS OF POTENTIAL CONFLICT WITH UNDERGROUND OR OVERHEAD UTILITIES. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE DUE TO CONTRACTOR'S NEGLIGENCE AND SHALL REPLACE OR REPAIR ANY DAMAGE AT CONTRACTOR'S EXPENSE.

8. LANDSCAPE PLANTING PITS MUST BE FREE DRAINING. PAVEMENT, COMPACTED SUBGRADE, AND BLASTED ROCK SHALL BE REMOVED TO A DEPTH OF 2' OR TO A GREATER DEPTH IF REQUIRED BY PLANTING DETAILS OR SPECIFICATIONS. REPLACE SOIL WITH MODERATELY COMPACTED LOAM OR SANDY LOAM FREE FROM STONES AND RUBBISH 1" OR GREATER IN DIAMETER AND ANY OTHER MATERIAL HARMFUL TO PLANT GROWTH AND DEVELOPMENT. PLANTING INSTALLATION SHALL BE AS DETAILED AND CONTAIN PLANTING MIX AS SPECIFIED UNLESS RECOMMENDED OTHERWISE BY SOIL ANALYSIS.

   PLANTING SOIL MIXTURE:
   2 PARTS PEAT MOSS
   5 PARTS TOPSOIL
   MYCORRHIZA INOCULANT - "TRANSPLANT 1-STEP" AS MANUFACTURED BY ROOTS, INC. OR APPROVED EQUAL. USE PER MANUFACTURER'S RECOMMENDATIONS FOR TREES AND SHRUBS. FERTILIZER/LIME APPLY AS RECOMMENDED BY SOIL ANALYSIS

- TREES, AND SHRUBS: TREES AND SHRUBS SHALL BE NURSERY GROWN UNLESS OTHERWISE NOTED AND HARDY UNDER CLIMATIC CONDITIONS SIMILAR TO THOSE IN THE LOCATION OF THE PROJECT. THEY SHALL BE TYPICAL OF THEIR SPECIES OR VARIETY, WITH NORMAL HABIT OF GROWTH. THEY SHALL BE SOUND, HEALTHY, VIGOROUS, WELL-BRANCHED AND DENSELY FOLIATED WHEN IN LEAF. THEY SHALL BE FREE OF DISEASE, INSECT PESTS, EGGS OR LARVAE. THEY SHALL HAVE HEALTHY AND WELL-DEVELOPED ROOT SYSTEMS. ALL TREES SHALL HAVE STRAIGHT SINGLE TRUNKS WITH THEIR MAIN LEADER INTACT UNLESS OTHERWISE STATED. THE OWNER, CERTIFIED LANDSCAPE INSPECTOR, OR LANDSCAPE ARCHITECT SHALL ONLY PERMIT SUBSTITUTIONS UPON WRITTEN APPROVAL. THEIR SIZES SHALL CONFORM TO THE MEASUREMENT SPECIFIED ON THE DRAWINGS. PLANTS LARGER THAN SPECIFIED ON THE DRAWINGS MAY BE USED IF APPROVED. THE USE OF SUCH PLANTS SHALL NOT INCREASE THE CONTRACT PRICE. ALL TREES AND SHRUBS SHALL BE MULCHED IN ACCORDANCE WITH THE RESPECTIVE PLANTING DETAIL(S) PROVIDED IN THE LANDSCAPING PLAN.

- ALL PRUNING SHALL CONFORM TO THE TREE CARE INDUSTRY ASSOCIATION (TCIA) ANSI A300 (PART 1) - 2017 PRUNING STANDARDS. PRUNING STANDARDS SHALL RECOGNIZE BUT, ARE NOT LIMITED TO, THE FOLLOWING PRUNING OBJECTIVES: MANAGE RISK, MANAGE HEALTH, DEVELOP STRUCTURE, PROVIDE CLEARANCE, MANAGE SIZE OR SHAPE, IMPROVE AESTHETICS, MANAGE PRODUCTION OF FRUIT, FLOWERS, OR OTHER PRODUCTS, AND/OR MANAGE WILDLIFE HABITAT. DEVELOPING STRUCTURE SHALL IMPROVE BRANCH AND TRUNK ARCHITECTURE, PROMOTE OR SUBORDINATE CERTAIN LEADERS, STEMS, OR BRANCHES; PROMOTE DESIRABLE BRANCH SPACING; PROMOTE OR DISCOURAGE GROWTH IN A PARTICULAR DIRECTION (DIRECTIONAL PRUNING); MINIMIZE FUTURE INTERFERENCE WITH TRAFFIC, LINES OF SIGHT, INFRASTRUCTURE, OR OTHER PLANTS; RAISE CROWN(S) FOR MOVEMENT OF TRAFFIC OR LIGHT PENETRATION; ENSURE LINES OF SIGHT OR DESIRED VIEWS; PROVIDE ACCESS TO SITES, BUILDINGS, OR OTHER STRUCTURES; AND/OR COMPLY WITH REGULATIONS.

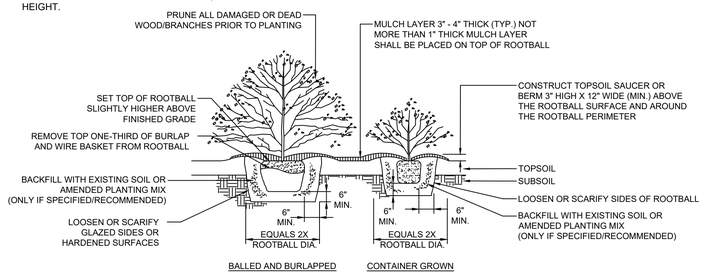
- TOPSOIL SHALL BE INSTALLED AT A MINIMUM DEPTH OF 4 INCHES. CONTRACTOR SHALL SUBMIT TOPSOIL TO A CERTIFIED TESTING LABORATORY TO DETERMINE PH, FERTILITY, ORGANIC CONTENT AND MECHANICAL COMPOSITION. THE CONTRACTOR SHALL SUBMIT THE TEST RESULTS FROM REGIONAL EXTENSION OFFICE OF USDA TO THE OWNER, CERTIFIED LANDSCAPE INSPECTOR, OR LANDSCAPE ARCHITECT FOR REVIEW AND APPROVAL. CONTRACTOR SHALL INCORPORATE AMENDMENTS FOR GOOD PLANT GROWTH AND PROPER SOIL ACIDITY RECOMMENDED FROM THE TOPSOIL TEST.

- NO PHOSPHOROUS SHALL BE USED AT PLANTING TIME UNLESS SOIL TESTING HAS BEEN COMPLETED AND TESTED BY A HORTICULTURAL TESTING LAB AND SOIL TESTS SPECIFICALLY INDICATE A PHOSPHOROUS DEFICIENCY THAT IS HARMFUL, OR WILL PREVENT NEW LAWNS/GRASSES AND PLANTINGS FROM ESTABLISHING PROPERLY.

- IF SOIL TESTS INDICATE A PHOSPHOROUS DEFICIENCY THAT WILL IMPACT PLANT AND LAWN ESTABLISHMENT, PHOSPHOROUS SHALL BE APPLIED AT THE MINIMUM RECOMMENDED LEVEL PRESCRIBED IN THE SOIL TEST FOLLOWING ALL APPLICABLE STANDARDS, REQUIREMENTS, AND/OR REGULATIONS.

- ALL SLOPES GREATER THAN 3:1 RECEIVING A WILDFLOWER, WETLAND, AND/OR GRASS SEEDING MIXTURE SHALL BE COVERED WITH AN EROSION CONTROL BLANKET.

- ALL WILDFLOWERS AND GRASSES SOWED SHALL BE ALLOWED TO GROW TO THEIR NATURALLY OCCURRING HEIGHTS WHENEVER POSSIBLE. NATIVE WILDFLOWERS AND/OR GRASSES CAN BE MOWED/MAINTAINED (WITHIN ACCEPTABLE AREAS IDENTIFIED AND/OR APPROVED BY APPROPRIATE REGULATORY AGENCIES) AS OFTEN AS NEEDED TO KEEP THE VEGETATION AT A DESIRED AND/OR MANAGEABLE/MANICURED HEIGHT.



SHRUB PLANTING DETAIL

N.T.S.

NOTE:

- IN AREAS WITH MASS PLANTINGS, CONTINUOUS EXCAVATION AND MULCHING PRACTICES SHALL BE IMPLEMENTED WHENEVER POSSIBLE
- IT IS NOT RECOMMENDED TO AMEND THE EXISTING SOIL BEFORE BACKFILLING THE HOLE UNLESS SOIL CONDITIONS ARE POOR FOR PLANTING.
- WATER THOROUGHLY TO HELP ENSURE THE REMOVAL OF AIR POCKETS.

LEGEND - OVERALL PLANTING TOTALS

LANDSCAPE PLANTING SCHEDULE — VISUAL MITIGATION PLANTING TEMPLATE TYPES A & B

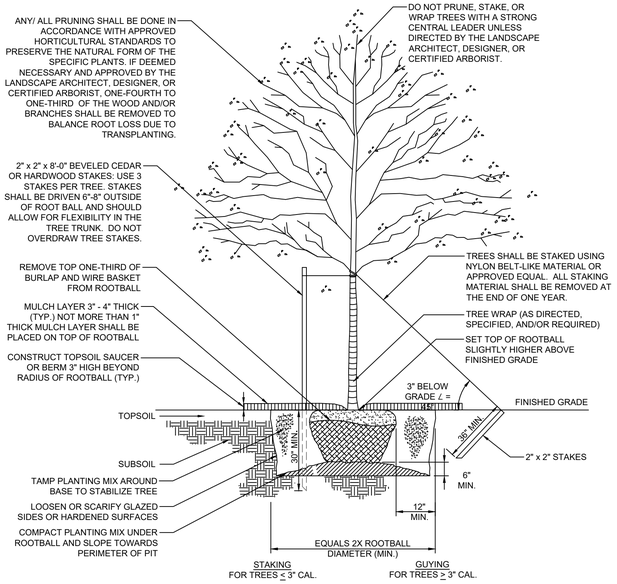
DECIDUOUS AND EVERGREEN TREES

SYMBOL	BOTANICAL NAME/ COMMON PLANT NAME	QUANTITY	SIZE	ROOT	MATURE HEIGHT
AA	AMELANCHIER ARBOREA DOWNY SHADBUSH	61	4'-5' HT. CLUMP	B&B	20'-25' HT.
AB	ABIES BALSAMEA BALSAM FIR	20	5'-6' HT.	B&B	40'-60' HT.
CC	CARPINUS CAROLINIANA AMERICAN HORNBEAM	33	1.5" - 2" CAL.	B&B	25'-30' HT.
CF	CORNUS FLORIDA FLOWERING DOGWOOD	28	1.5" - 2" CAL.	B&B	20'-25' HT.
HV	HAMAMELIS VIRGINIANA COMMON WITCH HAZEL	50	3'-4' HT.	B&B	20'-25' HT.
JV	JUNIPERUS VIRGINIANA EASTERN RED CEDAR	48	5'-6' HT.	B&B	40'-50' HT.
PA	PICEA ABIES NORWAY SPRUCE	32	5'-6' HT.	B&B	40'-60' HT.
PG	PICEA GLAUCA WHITE SPRUCE	49	5'-6' HT.	B&B	40'-60' HT.
TO	THUJA OCCIDENTALIS NORTHERN WHITE CEDAR	71	5'-6' HT.	B&B	40'-50' HT.

SHRUBS

SYMBOL	BOTANICAL NAME/ COMMON PLANT NAME	QUANTITY	SIZE	ROOT	MATURE HEIGHT
AR	ARONIA ARBUTIFOLIA RED CHOKEBERRY	12	24"-30" HT.	3 / 5 GAL. CONT.	7'-10' HT.
CS	CORNUS SERICEA RED TWIG DOGWOOD	73	24"-30" HT.	3 / 5 GAL. CONT.	7'-9' HT.
IV	ILEX VERTICILLATA COMMON WINTERBERRY	100	24"-30" HT.	3 / 5 GAL. CONT.	10'-12' HT.
VC	VACCINIUM CORYMBOSUM HIGHBUSH BLUEBERRY	7	24"-30" HT.	3 / 5 GAL. CONT.	6'-12' HT.
VP	VIBURNUM PRUNIFOLIUM BLACKHAW VIBURNUM	55	24"-30" HT.	3 / 5 GAL. CONT.	10'-12' HT.
VT	VIBURNUM TRILOBUM AMERICAN CRANBERRY	12	24"-30" HT.	3 / 5 GAL. CONT.	8'-10' HT.

VISUAL MITIGATION PLANT TOTALS



NATIVE/DECIDUOUS TREE PLANTING DETAIL

N.T.S.

NOTES:

- TREE PLANTING SHALL BEAR SAME RELATIONSHIP TO FINISH GRADE AS IT WAS PRE-DUG IN THE NURSERY.
- NEVER CUT THE PRIMARY LEADER.
- IT IS NOT RECOMMENDED TO AMEND THE EXISTING SOIL BEFORE BACKFILLING THE HOLE UNLESS SOIL CONDITIONS ARE POOR FOR PLANTING.
- WATER THOROUGHLY TO HELP ENSURE THE REMOVAL OF AIR POCKETS AND PROPERLY SET THE TREE.

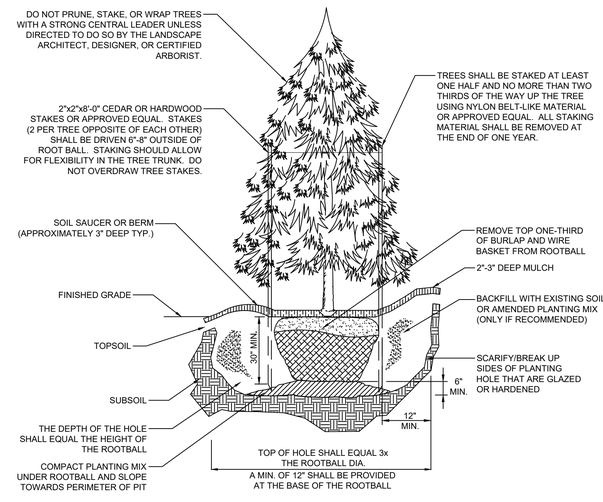
LOW GROWING SOLAR ARRAY MIX SOUTH & WEST

SCIENTIFIC NAME	COMMON NAME	SEEDS/SF	RATE (LBS/AC)	% MIX (BY SF)
COVER				
AVENA SATIVA	OATS	6	20.4200	12.85%
FORB				
GENTIANA ALBA	WHITE GENTIAN	0.41	0.01	
ALLIUM CERNUUM	NODDING ONION	0.51	0.12	
ANEMONE CANADESIS	CANADA ANEMONE	0.18	0.06	
ANEMONE CYLINDRICA	LONG-HEADED THIMBLEWEED	0.6	0.06	
ASCLEPIAS SYRIACA	COMMON MILKWEED	0.46	0.30	
ASCLEPIAS VERTICILLATA	WHORLED MILKWEED	0.32	0.08	
TRADESCANTIA OHIENSIS	OHIO SPIDERWORT	0.36	0.19	
ECHINACEA PALLIDA	PALE PURPLE CONEFLOWER	0.64	0.25	
EUTHAMIA GRAMINIFOLIA	GRASS LEAVED GOLDENROD	0.8	0.01	
GALIUM BOREALE	NORTHERN BEDSTRAW	0.4	0.02	
LIATRIS ASPERA	ROUGH BLAZING STAR	0.28	0.05	
LOBELIA SPICATA	ROUGH-SPIKED LOBELIA	1.03	0.00	
MONARDA FISTULOSA	WILD BERGAMOT	0.8	0.03	30.83%
PENSTEMON GRANDIFLORUS	LARGE-FLOWERED BEARD TONGUE	0.48	0.09	
PHLOX PILOSA	PRAIRIE PHLOX	0.11	0.02	
POTENTILLA ARGUTA	PRAIRIE CINQUEFOIL	0.53	0.01	
PYCNANTHEMUM VIRGINIANUM	VIRGINIA MOUNTAIN MINT	0.76	0.01	
RATIBIDA PINNATA	YELLOW CONEFLOWER	0.96	0.06	
RUDBECKIA HIRTA	BLACK-EYED SUSAN	1.58	0.05	
SISYRINCHIUM CAMPESTRE	FIELD BLUE EYED GRASS	0.52	0.03	
SOLIDAGO RIGIDA	STIFF GOLDENROD	0.47	0.03	
SOLIDAGO SPECIOSA	SHOWY GOLDENROD	0.55	0.02	
SYMPHYOTRICHUM ERICOIDES	HEATH ASTER	0.46	0.01	
SYMPHYOTRICHUM LAEVE	SMOOTH ASTER	0.63	0.03	
ZIZIA APTERA	HEART-LEAVED ALEXANDERS	0.55	0.12	
GRAMINOID				
BOUTELOUA CURTIPENDULA	SIDE-OATS GRAMA	3.31	1.50	
CAREX VULPINOIDEA	FOX SEDGE	4.59	0.31	
KOELERIA MACRANTHA	JUNEGRASS	4.59	0.07	41.90%
SCHIZACHYRIUM SCOPARIUM	LITTLE BLUESTEM	4.13	0.75	
SPOROBOLUS HETEROLEPIS	PRAIRIE DROPSEED	2.94	0.50	
LEGUME				
ASTRAGALUS CANADENSIS	CANADA MILK VETCH	0.78	0.12	
DALEA CANDIDA	WHITE PRAIRIE CLOVER	1.74	0.25	9.83%
DALEA PURPUREA	PURPLE PRAIRIE CLOVER	2.07	0.38	
SEDGE				
CAREX BICKNELLII	BICKNELL'S SEDGE	0.78	0.12	
CAREX BREVIOR	SHORT SEDGE	0.67	0.07	4.58%
CAREX PENSYLVANICA	PENNSYLVANIA SEDGE	0.69	0.06	

NOTE: GRASS SEED MIXES ARE COMPRISED OF GRASSES AND WILDFLOWERS THAT ARE NATIVE AND/OR INDIGENOUS TO THE AREA AND/OR CONSIDERED FAVORABLE FOR WILDLIFE HABITAT AND SUSTAINABLE GROWTH. ADDITIONALLY, THE SOLAR FARM SEED MIX WAS DEVELOPED ESPECIALLY FOR NATIVE GRASS PLANTINGS AROUND SOLAR ARRAY FIELDS AND SHALL BE UTILIZED ACCORDINGLY.

SEED MIXES TO FOLLOW SAMPLE SPECIFICATIONS FOR THE ESTABLISHMENT OF NATIVE VEGETATION AS PART OF HABITAT FRIENDLY SOLAR PROJECTS DEVELOPED BY THE MINNESOTA BOARD OF WATER AND SOIL RESOURCES AND THE MINNESOTA DEPARTMENT OF NATURAL RESOURCES. SEE "PRAIRIE ESTABLISHMENT & MAINTENANCE TECHNICAL GUIDANCE FOR SOLAR PROJECTS" BY THE MINNESOTA DEPARTMENT OF NATURAL RESOURCES, LAST REVISED JULY 2020, FOR FERTILIZER AND PESTICIDE APPLICATION RULES, REGULATIONS AND RESTRICTIONS.

SOLAR FARM SEED MIX



EVERGREEN TREE PLANTING DETAIL

N.T.S.

NOTES:

- TREE PLANTING SHALL BEAR SAME RELATIONSHIP TO FINISH GRADE AS IT WAS PRE-DUG IN THE NURSERY.
- NEVER CUT THE PRIMARY LEADER.
- IT IS NOT RECOMMENDED TO AMEND THE EXISTING SOIL BEFORE BACKFILLING THE HOLE UNLESS SOIL CONDITIONS ARE POOR FOR PLANTING.
- WATER THOROUGHLY TO HELP ENSURE THE REMOVAL OF AIR POCKETS AND PROPERLY SET THE TREE.

NOT FOR CONSTRUCTION

ROUNDSTONE SEED MIX 108: GRASS MEADOW ECONOMY: MEDIUM TO WET SITES

MIX CONCN.	BOTANICAL NAME	COMMON NAME	RATE (LBS/ACRE)	RATE (LBS/1000 FT²)
19.53%	BIG BLUESTEM	ANDROPOGON GERARDII		
27.34%	VIRGINIA WILD RYE	ELYMUS VIRGINICUS		
11.72%	SWITCHGRASS (BLACKWELL)	PANICUM VIRGATUM		
3.91%	DEER TONGUE GRASS	PANICUM CLANDESTINUM		
1.25%	BUTTERFLY MILKWEED	ASCLEPIAS TUBEROSA		
2.47%	BLACKEYED SUSAN	RUDBECKIA HIRTA		
1.86%	OHIO SPIDERWORT	TRADESCANTIA OHIENSIS		
7.85%	WILD SENNA	CASSIA MARILANDICA	12	.275
4.55%	ILLINOIS BUNDLEFLOWER	DESMANTHUS ILLINOENSIS		
6.97%	PURPLE CONEFLOWER	ECHINACEA PURPUREA		
6.60%	FALSE SUNFLOWER	HELIOPSIS HELIANTHOIDES		
0.84%	BERGAMOT	MONARDA FISTULOSA		
0.89%	NEW ENGLAND ASTER	ASTER NOVAE-ANGLIAE		
3.89%	MAXIMILIAN SUNFLOWER	HELIANTHUS MAXIMILIANI		
0.36%	JOE-PYE WEED	EUPATORIUM FISTULOSUM		

NOTE: GRASS SEED MIXES ARE COMPRISED OF GRASSES AND WILDFLOWERS THAT ARE NATIVE AND/OR INDIGENOUS TO THE AREA AND/OR CONSIDERED FAVORABLE FOR WILDLIFE HABITAT AND SUSTAINABLE GROWTH. ADDITIONALLY, THE WET MEADOW SEED MIX WAS DEVELOPED ESPECIALLY FOR NATIVE PLANTINGS WITHIN LOW WET AREAS OF THE SITE, DRAINAGE SWALES, AND DEPRESSIONAL AREAS, AND SHALL BE UTILIZED ACCORDINGLY. THESE PLANTINGS WILL MATURE OUT TO A HEIGHT OF APPROXIMATELY 3 TO 3 1/2 FEET HIGH.

WET MEADOW SEED MIX

SEAL:

PROFESSIONAL ENGINEER:
ANDREW B. GRAHAM
062046682

EXPIRATION DATE:
11/30/23

TRC ENVIRONMENTAL CORP.
DESIGN FIRM LIC. # 184004960002

NO.	BY	DATE	REVISION	APP'D.
1	CC	08/02/2023	ISSUED FOR PERMIT	ABG

PROJECT:
PERMIT PLAN SET
RPIL SOLAR 8, LLC
PLATO ROAD SOLAR
KANE COUNTY, IL

TITLE:
LANDSCAPE DETAILS 1

DRAWN BY:	G. TURNER	PROJ. NO.:	500015.0000.0006
CHECKED BY:	C. CAMERON		**L101**
APPROVED BY:	A.GRAHAM		
DATE:	AUGUST 2023		

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FILE NO.: 500015.0000.0006 L100 Land Plan.dwg