

Request for Proposal

City of Escanaba, Michigan

Municipal Electric Department

1 MW (DC) Municipal Utility Led Community Solar Project

January 22, 2018

Introduction & Background

The municipal Electric Department for the city of Escanaba, Michigan is seeking turnkey engineer, procure, construct (i.e., EPC) and start-up Proposals for a 1MW (DC) ground mounted fixed tilt angle solar project. The proposed site for the Escanaba Solar Project is within a 10 acre site in the Delta County Industrial Air Park at the Delta County Airport. The Google Earth image below shows the proposed ~305' x 1490' site.



Appendix A, attached, provides a more detailed site description along with key setbacks and site access information.

A FAA Form 7460 (Notice of Proposed Construction or Alteration – On the Airport) was submitted November 17, 2017 by Westwood Professional Services for the proposed Escanaba Solar Project. The Form 7460 Notice also includes a detailed solar glare analysis for the site. The following specifications were included in the Form 7460 and solar glare analysis:

- Solar PV panels are installed at a fixed tilt angle of 35 degrees and 180 degree azimuth
- The height of the PV structure may vary from 2' to 12' above grade
- Construction will take place between April 15th and November 14th, 2018
- Project electronic equipment will be compliant with FCC Part 15 rules.

The ForgeSolar solar glare analysis showed that the entire site shown on the Google Earth image of approximately 10 acres **Passed** the glare analysis providing the maximum flexibility in laying out the solar panel arrays. The Form 7460 and ForgeSolar glare analysis are attached in Appendix B.

Westwood Profession Services also conducted a site solar shade analysis using the SolMetric SunEye system. The solar access was measured at 22 locations on the site. The average annual solar access percentage ranged from 98 to 100% with 100% equaling full sun with zero shading. Appendix C contains additional information and the Westwood report on the site shade analysis.

Westwood Professional Services also conducted an extensive Geotechnical Assessment along with pile (driven and helical) load testing on the airport site. The investigation revealed no sub-surface conditions that would preclude development of the proposed solar energy facility.

The pile load testing included the following types of measurements:

- Helical pile torque probe testing to 10' depths along two east to west lines across the site.
- Four driven piles W-section (wide flange I-beams) to depths of 8' and 12' and four helical piles to 8' depths were installed for axial and lateral load testing.
- **No pile refusal or installation problems were experienced on the entire site.**

The Geotechnical testing included:

- Electrical resistivity testing using the Wenner four electrode method.
- Three soil test pits were excavated with soil samples collected for laboratory testing. Dynamic core penetrometer soil strength testing was performed and the groundwater depths were defined.
- Soil corrosivity was determined with pH, moisture content and soluble chloride measurements.
- **Because of the shallow groundwater depths, ranging from 4'3" to greater than 7' within the proposed site, the potential for frost heaving of the solar panel pile foundations is a potential concern which must be specifically addressed in the proposals responding to this RFP.**
- **Appendix D** contains the Westwood Geotechnical and pile load testing report.

The interface between the solar project Contractor and the Escanaba Electric Department project will occur at the AC Panel/Switchboard, combining the inverter 480 V (AC) outputs into a common AC bus with individual feeder breakers. **The Escanaba Electric Department responsibility will start at the AC wiring connecting the switchboard to a pad mounted transformer.** The location of two existing ground mounted Electric Distribution Boxes adjacent to the airport solar site, are identified in the Google Earth image of the proposed site on page 1 of this document. Escanaba's Electric Department will purchase and install the project related transformer, distribution voltage wiring, 480V (AC) wiring connecting the switchboard to the transformer, and the overall project metering equipment. The Electric Department project related AC wiring will be placed in underground conduit.

The solar project Contractor will be expected to include the transformer (up to 5' high) location in the proposed project design and co-ordinate with the Escanaba Electric Department for the required equipment installation. For multiple reasons, the linkage to the City distribution system, using the existing Electric Distribution Box 1 on the eastern end of the site as shown on the Google Earth image on page 2, is preferred.

Minimum Requirements for Proposals

Each Proposal must satisfy these minimum requirements and specifications in order to be included in the evaluation process. Failure to meet the specified minimum requirements may result in rejection of the proposal.

- The proposal must provide a complete turnkey project for a 1 MW(DC) solar project that provides:
 - a. Engineering and Design
 - b. Procurement
 - c. Construction
 - d. Start-up with performance verification, and Operating and Maintenance training for the Escanaba Electric Department staff.

- Key specifications and technical information required for the ground mounted fixed tilt angle of 35⁰ and 180⁰ azimuth solar project Proposal are outlined below:
 - a. Specifications and requirements for the solar panel racking (i.e., support) and foundation systems in the Proposal are:
 - 60 psf minimum design ground snow load (Michigan building code)
 - 105 mph minimum design wind speed (3 second peak gust) based on the American Society of Civil Engineer's standards for Escanaba, MI.
 - The below ground support structures (driven or helical piles) must be hot dipped galvanized steel designed for a minimum 30 year functional life meeting ASTM A123 specifications. The zinc coating thickness should be defined in the project Proposal.
 - The above ground support structures may be galvanized steel (ASTM A123 or ASTM A653 specifications) or aluminum.
 - The warranty time must be defined in the Proposal.
 - Compliant with UL 2703

- **PE stamped design drawings and calculations must be provided.** The design calculations must be provided to address:
 - Snow loads
 - Wind loads
 - Frost Heave (It is anticipated that frost uplift may be the governing load in the foundation design. Note the 2013 research paper by T. Kibriya, [Construction Issues Faced by Renewable Energy Production Facilities – Solar PV Farms in Ontario, Canada](http://oaji.net/articles/2014/437-1391267564.pdf), downloadable at: <http://oaji.net/articles/2014/437-1391267564.pdf>. The Frost Heave design analysis should include the frost penetration depth and the factor of safety used in the Frost Heave design.

- b. Specifications and technical information required for the solar panels in the Proposal are:
 - Identify solar panel manufacturer, address and website
 - Solar panel module model
 - STC output performance data
 - Cell type or technology
 - Percent power output tolerance between modules
 - Module product warranty on materials and workmanship
 - Power output warranty
 - During 1st year, % of labeled power output
 - For years 2 to 25 (warranted annual degradation rate)
 - The solar panel manufacturer is expected to have an extended history of producing high quality and reliable solar panels

- c. Specifications and technical information required for the DC Power Optimizers (if proposed) and Inverters in the Proposal:
 - DC Power Optimizers if proposed provide:
 - Identify Manufacturer, address and website
 - Model
 - Efficiency, %
 - Warranty years and cost, and warranty extension options and cost if available
 - Inverters
 - Identify Manufacturer, address and website
 - Model
 - DC to AC Energy Conversion Efficiency
 - Compliance with UL 1741, ANSI 62.41, and IEEE 1547-2003 safety design standards
 - AC Output voltage, 480

- Standard warranty years
- Cost and number of years for extended warranty options
- Capable of complying with NERC PRC-024-2 frequency and voltage ride through specifications
- If String Inverters are utilized, provide the calculations used to determine the number of PV modules per inverter.
- Enclosure rating must be NEMA 3R
- Provide the design DC to AC Ratio: $(\text{Solar PV DC (STC)})/(\text{Inverter AC(Max)})$ design used in the Proposal, also known as the Inverter Load Ratio
- The inverter manufacturer is expected to have an extended history of producing high quality, efficient and reliable inverters

d. Specifications and technical information for the Web-based Central Data Acquisition and Monitoring Systems are:

- i. Identify supplier and model
- ii. A minimum of inverter level data acquisition is required
- iii. Service contracts must be identified if required
- iv. Warranty provided

e. This base RFP package does not include PV plus Battery Storage as a technology option. However, each proposal response is asked to identify on a site plan where future battery storage could be incorporated into the proposed solar project design. The proposal should be specific on how battery storage would be added in the future, and what facility modifications would be required. The future battery storage would provide solar energy generation time shifting **to maximize Escanaba’s Avoided Transmission and Capacity Costs.** To maximize the Avoided Costs, a portion of the solar generation would be shifted to the following time periods:

January thru March	7 to 9PM EST	Reduce Monthly Transmission Co-incident load
April thru September	3 to 6 PM EST	Reduce both Monthly Transmission Co-incident and annual Capacity Peak Loads
October thru December	7 to 9 PM EST	Reduce Monthly Transmission Co-incident load

f. Each proposal, at a minimum, must provide the following design documents, drawings and other information:

- i. Site Plan
- ii. Electrical single line diagram
- iii. Solar array layout
- iv. Solar power system feeder schedule
- v. Solar power system grounding plan
- vi. Structural plans, provided by PV support structure manufacturers
- vii. PV module system structural installation plans, construction details and calculations
- viii. Proposed project execution timeline
- ix. Proposed field acceptance test certification procedures
- x. Planned Operations and Maintenance training and documentation
- xi. References – Bidders may be required to demonstrate they are capable of executing their proposal. References of past projects should be submitted.
- xii. Proposals shall remain valid thru June 1, 2018.

g. **The Proposal must provide the following complete turnkey cost and performance data which will be used to evaluate and select the best RFP response:**

- The total turnkey installed cost
 - Total cost, \$
 - \$ / Watt (DC)
- The estimated annual energy production in MWH for the first year of operation using the NREL PVWatt Version 2. The use of the PVWatt calculator will put all the proposals on a common comparable basis for comparison and evaluation. In addition, PVWatt annual energy output will be used to estimate a 25 year levelized cost of solar generation for each proposal when combined with:
 - Total turnkey installation cost, and
 - PV module power output warranty data

The required input data for the PVWatt Version 2 calculator is summarized below:

- Zip code = 49829 (Escanaba, MI)
- Weather data source = TMY3 (Escanaba (AWOS), MI)
- DC system Size (kW) – **Proposal Based**
- Module Type – **Proposal Based**
- Array Type – Fixed (Open Rack)

- System Losses:
 - ❖ Soiling – Assume 2%
 - ❖ Shading – **Proposal Based** depending on array layout and Westwood Shade Analysis data
 - ❖ Snow – Assume 3%
 - ❖ Mismatch – **Proposal Based**
 - ❖ Wiring – **Proposal Based**
 - ❖ Connections – **Proposal Based**
 - ❖ Light Induced Degradation – **Proposal Based**
 - ❖ Nameplate Rating – **Proposal Based**
 - ❖ Age – **Proposal Based**
 - ❖ Availability – **Proposal Based** (using estimated scheduled and unscheduled system shutdowns)
- Tilt (degrees) = 35⁰
- Azimuth (degrees) 180⁰
- Advanced Parameters:
 - ❖ DC to AC Size Ratio – **Proposal Based**
 - ❖ Inverter Efficiency (%) – **Proposal Based**
 - ❖ Ground coverage Ratio – use default value

For the **Proposal** to be considered, the PVWatt calculated annual generation and **Proposal** based input data must be included with the **Proposal**.

RFP and Project Timetable

	Date
Project RFP Released	January 22, 2018
Proposals Due	March 9, 2018
Bid Evaluation	March 10 – 30 th , 2018
Select Best Proposal to Seek Council Approval	April 5 – 12 th , 2018
Sign Contract by	April 20 th , 2018
Time to Purchase, Deliver & Construct Project	6 ½ months
Complete Start up on or before	November 9 th , 2018

Proposals responding to the RFP must be received at the Escanaba Electric Department by 4PM EST on Friday March 9th, 2018. The mailing address is:

**Escanaba Electric Department
1711 Sheridan Road
Escanaba, MI 49829**

RFP Process

The City of Escanaba, Michigan, Electric Department, at any stage in the RFP process, reserves the right to:

1. Reject any and/or all Proposals received in response to this RFP for any reason and with no reason provided.
2. Waive errors and/or omissions by Bidders in any Proposal if corrected to the Escanaba Electric Department satisfaction.
3. Reject any Proposals not received on or before the Proposal Due Date and Time.
4. Accept a Proposal other than the lowest price due to non-price considerations.
5. Request clarification from Bidders at any time.
6. Amend this RFP at any time.
7. Request additional information deemed necessary for evaluation.

By submitting a Proposal to the Escanaba Electric Department in response to this RFP, the Bidder certifies that the Bidder has not divulged, discussed or compared their Proposal with other Bidders, and has not colluded with any other Bidders or parties to other Proposals whatsoever.

A Proposal may be disqualified at any point in the evaluation process if the Escanaba Electric Department determines, in its sole discretion, that the Bidder has attempted to gain an advantage through conduct deemed unethical, conflict of interest, interference, or any such means.

Each page of the RFP response should be clearly identified as to whether it contains confidential or proprietary information.

Supplemental RFP Proposal Options

1. **Once a Bidder has provided a Proposal in response to the base RFP**, the Escanaba Electric Department will consider a **supplemental Proposal that includes the addition of Battery Storage and related equipment for solar energy generation time shifting** to increase Escanaba's avoided transmission and capacity costs. The time shifting periods were summarized on page 5 of this RFP. The time shifting is only required on weekdays, since Monthly Co-incident Loads and the Annual Peak Load do not occur on weekends.

The supplemental bid should include the following information:

- a. Design and layout of Battery Storage system
 - b. Battery energy storage capacity, kWh
 - c. Power capacity, kW output rating
 - d. Discharge time which battery can discharge at its rated power
 - e. Cycle life – Number of charge and discharge cycles that the proposed battery system can sustain within its expected useful life
 - f. Self-discharge rate
 - g. Round trip efficiency
 - h. Battery supplier and technology, model number
 - i. Warranty information on battery and related components (e.g., battery converter or inverter)
 - j. Incremental turnkey EPC (Engineer Procure & Construct) project cost for the addition of a battery storage system, or the total PV + Battery Storage EPC project cost.
2. **Once a Bidder has provided a Proposal in response to the base RFP**, the Escanaba Electric Department will consider **supplemental Proposals that include:**
PV only,
PV + Battery Storage, or
Battery Storage only,

A PPA for the first five years of the Project's life with the option to purchase the Project in the sixth year for its Fair Market Value.

The PPA supplemental Proposal must clearly define:

- **Any design or equipment differences with the turnkey EPC Proposal**
- **How Fair Market Value will be established to purchase the Project at the sixth year.**

Successful Bid Proposal Contract Insurance and Performance Bond Requirements

Insurance Requirements

The Contractor shall furnish proof of insurance before the start of work, establishing minimum coverages as follows:

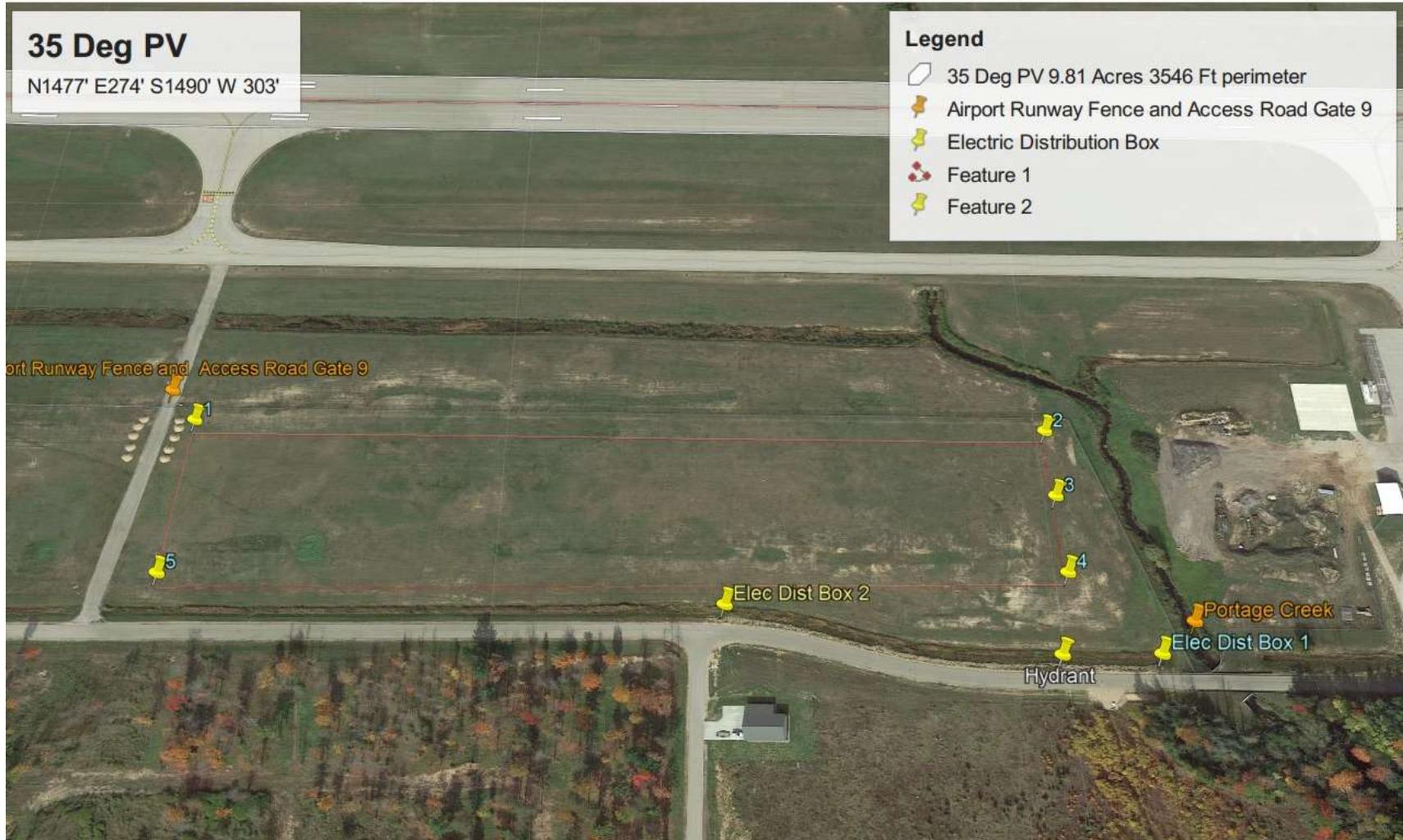
Worker's Compensation	
Coverage A	Statutory
Coverage B	\$100,000
Comprehensive General Liability	
Per Occurrence	\$1,000,000
General Aggregate	\$1,000,000
Products/completed operations	
General Aggregate	\$1,000,000
Comprehensive Automobile Liability	
Combined Single Limits	\$1,000,000

The City of Escanaba shall be named as “additional insured” on all certificates. All policies affording coverages required in this section shall further be endorsed to provide a ten (10) day notice to be delivered to the City before any coverages are either reduced or cancelled.

The Contractor will be required to furnish a performance bond upon notification of the acceptance of his Proposal. The performance bond will be for 100% of the Proposal amount.

Appendix A – Escanaba Solar Project Site Description and Key Set-backs

The proposed site for the Escanaba Solar Project is within an ~10 acre site on the Delta County Industrial Air Park at the Delta County Airport (KESC) in Escanaba, MI. The Google Earth image below shows the proposed site.



Security Fence: Once the boundary of the solar arrays are established in the project design, the Escanaba Electric Department will be responsible for installing a 7 foot high security fence and gates, surrounding the project on three sides. The north side of the project will use the existing 8' 9" Airport security fence. **The EPC developer should account for shading issues from the security fence when designing the project layout and include the fence location in the proposed project drawings.**

Key Site Setback Assumptions:

1. The south security fence will be at least 10' north of the Airport Road ditch.
2. The west security fence will be at least 10' from the edge of the Access Road to Gate 9 near the runway.
3. The east security fence will be at least 30' from the underground sewer line which is east of the solar project site boundaries identified on the Google Earth image.
4. The solar panel rows will be at least 10' south of the existing airport runway 8'9" security fence.
5. The first row of solar panels on the south side of the site is expected to be at least 25' north of the planned 7' security fence to avoid shade from the fence.

Access routes to the site: Access to the site for construction can be obtained by two potential routes:

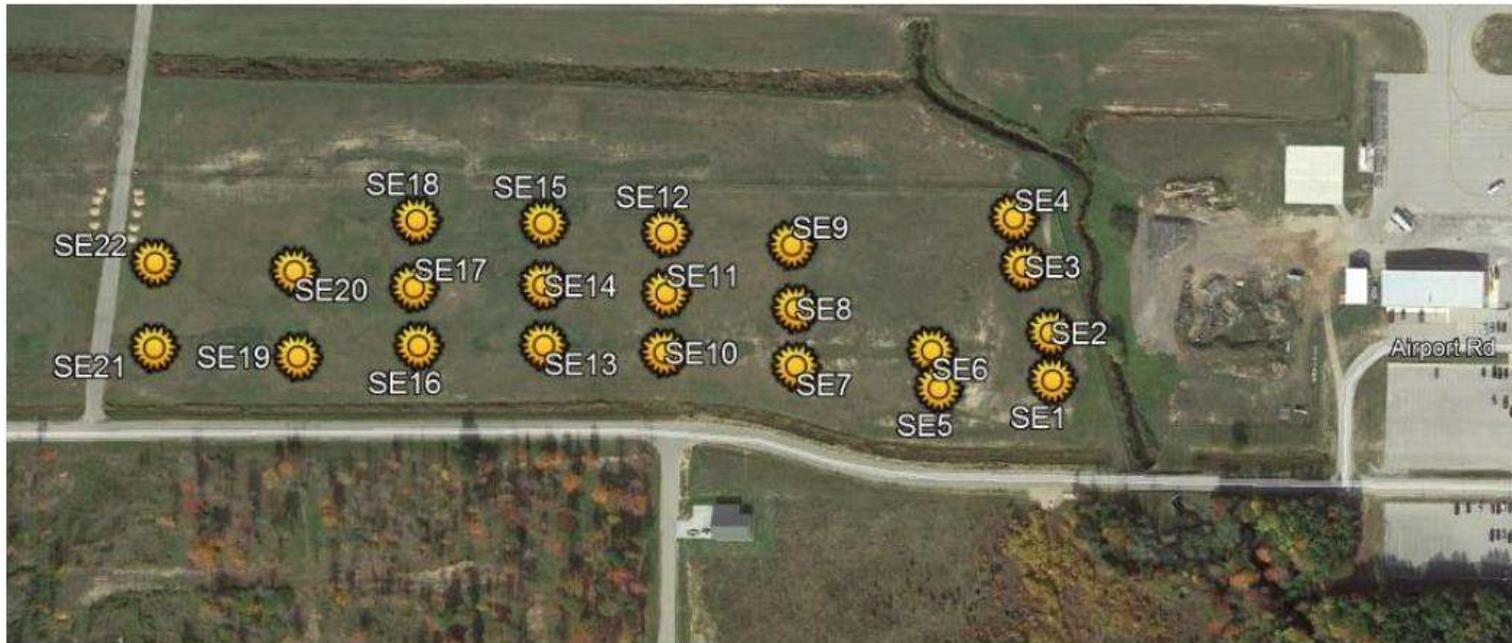
1. On the west side of the site, an emergency access road to Gate 9 provides access to the site from the Airport Road and crosses the ditch along the south side of the site. Because this access road to Gate 9 provides emergency access to the airport runways, construction equipment may not be parked on the access road.
2. On the east side of the site, an existing culvert, next to Portage Creek, provides a grass covered route for light vehicles to access the site from the south-east corner.

Appendix B - FAA Form 7460 and ForgeSolar Glare Analysis

Westwood Professional Services of Eden Prairie, MN prepared and filed the FAA Form 7460 including a ForgeSolar Glare Analysis. See attached.

Appendix C – Airport Site Solar Shade Analysis

The Westwood airport site solar shade analysis data collection, using a SolMetric SunEye system, occurred on November 1, 2017. **The trees south of Airport Road retained full leaf-on coverage.** The lowest solar access occurs on the southern perimeter of the site, just north of the Airport Road, from the trees on the south side of the Airport Road. The figure below illustrates the location of the individual 22 solar assessment locations.



The Westwood Solar Access and Shade Analysis report is attached.

Appendix D – Site Geotechnical Assessment and Pile Load Testing

The Westwood Professional Services Geotechnical Assessment report and pile load testing for the airport site are attached.