

South Forty Solar, LLC  
300 Swift St.  
South Burlington, Vermont 05403  
Telephone: (802) 578-2536

March 5, 2014

***By Hand Delivery***

Burlington City Council  
and  
Burlington Planning Commission  
149 Church Street  
Burlington, VT 05401

Chittenden County Regional Planning Commission  
110 West Canal Street, Suite 202  
Winooski, VT 05404-2109

Re: Proposed Solar Project — Sunset Cliff Road, Burlington, Vermont  
45-Day Notice of Petition to be filed Under Section 248 at Vermont Public Service Board

Dear Councilors and Commissioners:

Pursuant to 30 V.S.A. §248(f) and Vermont Public Service Board ("PSB") Rule 5.402(A), South Forty Solar, LLC ("SFS") submits the following pre-application notice ("45 Day Notice Letter") concerning its proposed 2.5 megawatt (MW) solar project, to be sited on land off of Sunset Cliff Road in Burlington, Vermont. SFS anticipates filing a formal Section 248 petition with the PSB soon after the 45-day notice period expires, in mid-April 2014.

**Introduction**

SFS intends to seek a Certificate of Public Good ("CPG") from the PSB, to install and operate a 2.5 MW +/- (AC) solar electric generation facility to be known as the South Forty Solar Farm (the "Project") in Burlington, Vermont. The Project would be sited on a 39.2 acre parcel of land that is accessed from Sunset Cliff Road (a private road). The electricity from the Project will be sold to Burlington Electric Department ("BED") under a long-term Purchase Power Agreement ("PPA") recently approved by the Burlington City Council.

In preparation for filing the Section 248 Petition, SFS has been gathering information concerning the site's solar resource characteristics, interconnection requirements to the BED system, and environmental and other land-use conditions. This 45 Day Notice Letter will briefly describe the proposed Project and surrounding conditions including: (1) SFS's plans for construction and operation of the Project; (2) the expected benefits of the Project; (3) a preliminary impact assessment and consideration of on-site alternatives; (4) the expected date a

Section 248 Petition will be filed with the PSB; and (5) the rights of the local and regional planning commissions to comment on the Project plans in accordance with Board Rule 5.402(A).

Included with this letter are a location map (*Attachment A*), site plan (*Attachment B*), equipment specifications (*Attachment C*), and preliminary aesthetics assessment (*Attachment D*).

### **1. Project Site, Equipment, and Construction Plans**

The proposed South Forty Solar Farm is a 2.5 Megawatts (+/-) (MW) (AC) solar electric generation facility located on Sunset Cliff Road, in Burlington, Vermont. The Project is expected to generate approximately 3,750,000 kilowatt hours (kWh) of electrical energy per year, which is enough to serve approximately 700 average Burlington households.<sup>1</sup>

The Project will be sited on a 39.2 (+/-) acre property held by Keystone Development Corporation (an affiliate of SFS) under a long term lease. The Project parcel is currently undeveloped although in the past it was used for agricultural purposes. The parcel is bordered to the west and east by residential lots ranging from 1/8 to 3/4 acre in size. The southern boundary is comprised of similar single family house lots, but a small park and open space area provide a buffer to the parcel. The northern boundary of the tract is bordered by Sunset Cliff Road (located on Keystone's parcel) and a 19-acre parcel with seasonal "camps" located beyond, on the shore of Lake Champlain.

The Project's site plan was designed to meet a number of objectives: minimize the project footprint while maintaining the economic viability of the solar electric generation facility; maintain appropriate separation or screening from surrounding land uses; minimize shading of the solar panels; and minimize impacts to environmental resources including wetlands and sensitive natural communities. The solar array area will be located on the northern portion of the property which consists of a mix of open field, scrub/shrub vegetation and upland forest. This area will be cleared of vegetation to allow optimal solar generation.<sup>2</sup> *See Attachments A and B.*

#### **Solar Panels and Racking System**

SFS intends to install approximately 11,000 300-watt solar panels, with a combined rating of 3.3 MW (DC). *See Attachment C.* The final panel selection will be made prior to the initiation of construction based upon market conditions, but, in any case, the panels used will be materially similar to the panels shown in Attachment C.

The solar cells in each panel are dark blue in color and the panel glass is treated with an anti-reflective (AR) coating that lowers the overall reflectivity of a typical panel to less than 5%, which is well below the reflectivity of surrounding vegetation.

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<sup>1</sup> Based on the average residential use of approximately 5,400 kWh per year, as reported by BED.

<sup>2</sup> A final layout will be included with SFS's Section 248 Petition. Any variations between the attached site plan and the final plan are not expected to be substantial.

The individual solar panels comprising each "array" are mounted on a rack system. The solar arrays and associated equipment will occupy approximately 18.5 acres of the parcel. Approximately 506 arrays will be utilized, depending on the final panel selection. The arrays will be set on driven steel foundation piles to hold the solar panels at a fixed angle of 30 degrees, to maximize solar radiance collection. The use of a driven pile foundation will not require any significant excavation or placement of precast concrete under the panel array and thus will minimize soil and vegetation disturbance. The support structures are designed to hold the bottom of the solar panels at approximately 4 feet above existing grade, which will allow snow to shed without creating buildup on the ground that might compromise energy production. The top of the solar panels will be approximately 10.5 feet above grade.

As shown in *Attachment B*, the arrays will be arranged in rows running east-west. The rows will be set a sufficient distance apart (approximately 35 feet) to minimize self-shading. The arrays will be connected via electrical cable in conduit to the inverters, which in turn will connect to transformers (see below). In areas outside of the wetlands and its 50-foot buffer zone, the electrical lines from the arrays to the inverter and the primary voltage lines to the BED interconnection point will be buried underground in conduit. In areas delineated as wet meadow or buffer zones, conduit for electrical and monitoring lines will be placed above ground supported by the array rack system.

#### Inverters and Transformers

SFS currently anticipates using five (5) Advanced Energy AE500NX (500 kW) inverters, or the equivalent, placed at two locations within the array rows. *See Attachment B*. The inverters will be housed in two prefabricated enclosures (1.5 MW and 1 MW), each of which is approximately 35 feet long by 12 feet wide by 10 feet high in dimension. The enclosures will also house controls, metering, and other necessary electrical equipment. The inverters in each structure will be connected to a medium voltage transformer located on each structure's steel deck. The transformers will use a non-toxic, biodegradable cooling oil. In addition, each structure will be equipped with a secondary oil containment pan under each transformer. The transformers will step up the inverter output (480V) to distribution voltage for interconnection to BED's distribution circuit (upgraded to 3 phase power) located on Starr Farm Rd. *See Attachments B and C – Site Plan and Equipment Specs*.

#### Other Project Components

A 24 foot x 48 foot maintenance "shed" will be constructed at the northwest corner of the site. The building will be used to store maintenance equipment and as a staging area for any service work that, from time to time, may need to be performed on the system. The location of the maintenance building is depicted on the site plan. In addition, a driveway and small parking area are also proposed to be constructed near the maintenance barn so that service personnel will not have to park on Sunset Cliff Road. Lastly, an information kiosk containing information

about the system is proposed to be located at the northwest corner of the site to provide invitees with an opportunity to view the Project.<sup>3</sup>

The solar arrays and other equipment will be surrounded by a 6-foot high wire mesh fence that is consistent with fencing at other Vermont solar projects and satisfies the National Electrical Code. *See Attachment C, sheet 9.*

### Construction and Operation

Project construction is expected to take approximately 16 weeks. The general sequence of construction will be as follows: The first phase of construction will include the clearing of the treed area sited for panel installation. Soils in the upland area will be rehabilitated to enhance their capacity to infiltrate stormwater runoff. After clearing, a gravel access road to the inverter locations will be constructed and underground 3-phase primary wiring will be installed to the point of interconnection with BED. The second phase of construction will involve construction of the array support structures. The final phase of the construction will involve installation of the solar modules, placement of the inverter enclosures, and wiring to the enclosures. Following completion of these activities, the system will be tested and commissioned for operation.

The Project incorporates low-impact design characteristics including:

- Impervious surfaces will be limited to a 12-foot wide gravel access road, maintenance shed and parking area.
- Solar array support structures in the wetland areas will be pile driven causing very limited soil disturbance.
- Native soils will remain in place. Forested areas to be cleared will be tilled and the soils amended to improve infiltration rates. The areas beneath and around the arrays will remain vegetated, although the land inside the fence (and a 10 foot strip outside) will be routinely mowed.
- Tree clearing and pruning will be the minimum needed to avoid shading of the solar panels.

Daily access to the array is not required. The solar array production will be monitored remotely, with technicians dispatched to the site on only an as-needed basis.

### Site Access and Equipment Delivery

The Project will be accessed from North Avenue to Starr Farm Road and then onto Sunset Cliff Road to the site parcel. The service road through the solar arrays will provide access to the two inverter/transformer enclosures.

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<sup>3</sup> SFS intends, on occasion, to invite schools and other interested persons and organizations to visit the site.

The solar panels and rack components will be shipped on pallets, typically delivered by standard tractor-trailer truck. SFS expect approximately 20 (+/-) truckloads will be needed to deliver the solar panels and racks over a 6-week period. In addition, the two inverter enclosures with transformers will be delivered by tractor-trailer after the solar array is installed. All other equipment and material including wire, cable, conduit, etc., will be transported to the site utilizing standard-width trucks.

Construction equipment for installing electrical conduit and the solar array will likely include a tire or track mounted excavator and a small pile driver to install the foundation posts. A crane will be used for placement of the two inverter/transformer stations.

## **2. Project Benefits**

The South Forty Solar Farm's owner, South Forty Solar, LLC, a Vermont limited liability company, has entered into a long term (25 year) power purchase agreement to sell 100% of the Project's output to BED. This will provide the city with a long term energy source at stable prices, serving its electrical needs by supplying approximately 3,750,000 kWhs of solar power annually. The Project will also benefit the broader Vermont economy in other ways: by the payment of municipal and education taxes, by employing Vermont businesses for the development work, and, where commercially feasible, by purchasing Project equipment from Vermont companies and by employing Vermont businesses for construction, installation, and maintenance work.

The solar energy produced by the Project will result in substantial environmental benefits. BED has established the goal of increasing its supply of renewable energy sources in order to lower greenhouse gas emissions and provide stable long-term rates. The Project will support achievement of that goal and is in conformance with BED's approved 2012 Integrated Resource Plan. Likewise, the Vermont Legislature has set a goal for the state to receive 20% of its electrical energy from new renewable resources by the year 2017. The solar energy produced by this Project will result in less electricity needed in the New England region from plants that use fossil fuel or nuclear energy. It will produce no emissions, and thus will help in a small but measureable way to reduce global warming, acid rain, and the negative public health effects associated with the use of fossil fuel and the waste storage challenges presented by nuclear energy production.

## **3. Preliminary Impact Assessment**

SFS has employed a team of engineers and environmental and energy consultants with substantial experience with projects of this type. Based upon their assessment of conditions at this site, as well as work on other similar solar projects, SFS submits that the Project has been planned so that it will not cause undue adverse impacts to environmental resources, public health and safety, or aesthetics.

The solar array area is planned to be located on approximately 18.5 -acres at the northern portion of the property which consists predominantly of open field and upland forest. Approximately 8 acres of trees and 3 acres of shrubs will be cleared to allow placement of the solar panels and equipment. An additional clearing extent area (shrub management zone) is necessary beyond the fence line to allow for adequate solar gain. An additional selective tree height management zone within the designated 50 foot natural communities buffer is needed to allow for maintenance of optimal solar generation. *See Attachment B.*

The solar array racks are installed using driven piles,<sup>4</sup> a practice allowed under federal wetlands regulation). A State of Vermont Wetlands Permit is necessary for a small amount of wetland impact and for forest clearing within parts of the wetlands and the wetlands buffer. SFS has submitted its wetlands permit application to the Vermont Agency of Natural Resources. The application includes a vegetation management plan to regulate maintenance activities within the shrub management zone and the wetland/natural community buffer area.

To avoid and minimize environmental impacts, the project has been designed as follows:

- No earth moving, grading or excavation will be required in the wetlands or buffer zone.
- Solar array support structures and inverter enclosure foundations will be pile-driven steel to eliminate the need for concrete footings and foundation excavation in the wetlands and buffer zone.
- Electrical conduit will be run above grade in the wetlands and buffer zone.
- Accepted erosion control measures will be used to minimize the amount of sediment discharged to the wetlands.
- Soil restoration measures will be implemented in uplands to increase their capacity to retain rainfall and reduce both the peak rate and volume of stormwater leaving the site.
- The rare wetland natural community (Wet Sand-Over-Clay Forest) on the project parcel will not be impacted by the Project. In addition, because this natural community currently contains a variety of invasive species, SFS is proposing to perform invasive species control in this area.
- Clearing of forest vegetation in wetland limited to approximately 0.5 acres within wetlands and 0.9 acres of wetlands buffer. Direct impacts to wetlands limited to approximately 84 square feet of wetlands and 6 square feet of wetlands buffer.
- No undue adverse impact on the quality of wildlife habitat. A wildlife study and an avian habitat study found that wildlife species on this site are common and typical of that found

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<sup>4</sup> Based on Public Service Board requirements, the piles and all other project infrastructure will be removed at the time the Project is decommissioned.

in a suburban environment. The Vermont Wetlands Program has indicated that the wetlands on the site rate low for the wildlife function.

An operational stormwater permit (General Permit 3-9015) is not required for the project because the total amount of impervious surface proposed is under the jurisdictional threshold of one acre. A Construction General Permit (General Permit 3-9020) will be obtained as more than one acre of earth disturbance is anticipated. During construction, stormwater Best Management Practices will be implemented in accordance with ANR guidelines.

The Project will meet the safety standards of the National Electrical Code and utility interconnection standards for safe and reliable operation of solar electric plants. The Project will not impose undue burdens on fire, police, or water/sewer services.

#### Electrical – System Impact Study

A System Impact Study will be completed by BED. BED has created an initial interconnection and facility plan for the Project that indicates the existing single phase power line along Sunset Cliff Road will need to be upgraded to 3-phase power conductors that tie into existing 3-phase power at the corner of Starr Farm Road and Curtis Avenue.

#### Aesthetics

A preliminary visual assessment was conducted by the S.E. Group. S.E. Group's assessment indicates that the site is well suited to support the Project with minimal impact to nearby areas. If more extensive impacts are found to exist after review of the design presented to the PSB, the site and surrounding landscape lend itself to effective mitigation measures such as landscaping, context-appropriate fencing and inverter screening. A full aesthetics analysis will be included with the Section 248 Petition. The preliminary visual assessment is included as *Attachment D*.

The projected sound levels produced by the Project will meet noise guidelines/standards adopted by the USEPA, the WHO, and the Public Service Board. The estimated sound levels affecting the nearest residence to any of the noise producing components (645 feet in a northeasterly direction) would be 20 dBA (+/-). This low sound level is likely to be the same or lower than daytime background levels in the area.

#### On-Site Alternatives

SFS has entered into a PPA with BED to provide power from the Project. This is the only property owned or controlled by SFS that can satisfy the commitment under the PPA. Once the site was selected, SFS and its consultants reviewed various configurations within the parcel in order to minimize and avoid environmental, aesthetic, and other impacts while maintaining a viable project with minimal shading. The proposed configuration utilizes a low-impact design and locates the solar array so as to avoid sensitive environmental resources.

**4. Expected Petition Filing Date with Vermont Public Service Board**

SFS intends to file a Section 248 Petition and supporting materials with the PSB soon after the 45-day notice period expires, estimated in mid-April. Once the Section 248 Petition is filed, SFS would request the Board schedule any hearings and other necessary steps in the proceedings in time to render a decision by the fall of 2014. This schedule will allow the Project to be constructed and operational in 2015.

**5. Municipal and Regional Planning Commissions' Comments to the Vermont Public Service Board**

Under 30 V.S.A. Section 248(f), municipal and regional planning commissions "shall make recommendations, if any, to the Public Service Board and to the petitioner at least 7 days prior to filing of the petition with the Public Service Board." In addition, the planning commissions are entitled to provide revised recommendations "within 45 days of the date on which petitioner has filed a petition with the Board if the petition contains new or more detailed information that was not previously included in the petitioner's filing with the municipal and regional planning commissions pursuant to Section 248(f)." *See PSB Rule 5.402(A)(2).*

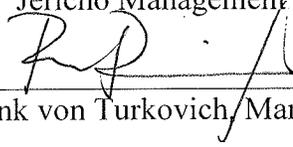
For additional information regarding this process, including your planning commission's right to participate in the Board proceeding, please refer to the "Citizens' Guide to the Vermont Public Service Board's Section 248 Process," which can be found by navigating to <http://psb.vermont.gov/sites/psb/files/publications/Citizens%27%20Guide%20to%20248%20February%2014%202012.pdf>.

Thank you for your attention to this matter. We look forward to progressing through the Section 248 process and welcome your input and suggestions to make this a successful Project.

Sincerely,

SOUTH FORTY SOLAR, LLC

By: Jericho Management Company, LLC, Manager

  
\_\_\_\_\_  
Frank von Turkovich, Managing Member



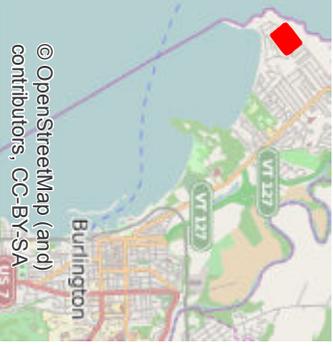
LAKE CHAMPLAIN



Source: Esri, DigitalGlobe, GeoEye, Earthstar, USDA, USGS, AEX, Getmapping, Aergrid, IGN, IGP, swisstopo, and the GIS User Community



**TRUETT CONSULTING ENGINEERS**  
802.879.6331 www.tcevt.com



**Legend**  
Project Parcel

**Notes**

Sources: Bing aerial photography (2012);  
VT 9711, Roads (2011);  
Project Parcel by TCE (2013).  
Disclaimer: The accuracy of information presented is determined by its sources; TCE is not responsible for any errors or omissions that may exist. Questions of on-the-ground location can be resolved by site inspections and/or surveys by a registered surveyor. This map is not a replacement for surveyed information or engineering studies.

**South Forty Solar Farm  
Sunset Cliff Road  
Burlington, VT**  
**Location Map**

Project: 2013113  
Prepared By: LMJ  
02/21/14  
1 Inch = 500 Feet



TRUDELL CONSULTING ENGINEERS  
478 BLAIR PARK ROAD | WILTON, VERMONT 05495  
802.879.4331 | WWW.TCEVT.COM

Revisions	No.	Description	Date	By

- Use of These Drawings
1. Unless otherwise noted, these Drawings are intended for preliminary planning, coordination with other disciplines or utilities, and/or approval from the regulatory authorities. They are not intended as construction drawings unless noted as such.
  2. Only drawings specifically marked "For Construction" are intended to be used in conjunction with contract documents, specifications, owner/contractor agreements and to be fully coordinated with other disciplines, including but not limited to, the Architect, if applicable. These Drawings shall not be used for construction layout. Contact TCE for any construction surveying services or to obtain electronic data suitable for construction layout.
  3. These Drawings are specific to the Project and are not transferable. As instruments of service, these drawings, and copies thereof, furnished by TCE are its exclusive property. Changes to the drawings may only be made by TCE. If errors or omissions are discovered, they shall be brought to the attention of TCE immediately.
  4. By use of these drawings for construction of the Project, the Owner represents that they have reviewed, approved, and accepted the drawings and have met with all applicable parties/disciplines to insure these plans are properly coordinated with other aspects of the Project. The Owner and Architect, are responsible for any buildings shown, including an area measured a minimum five (5) feet around any building.
  5. It is the User's responsibility to ensure this copy contains the most current revisions.

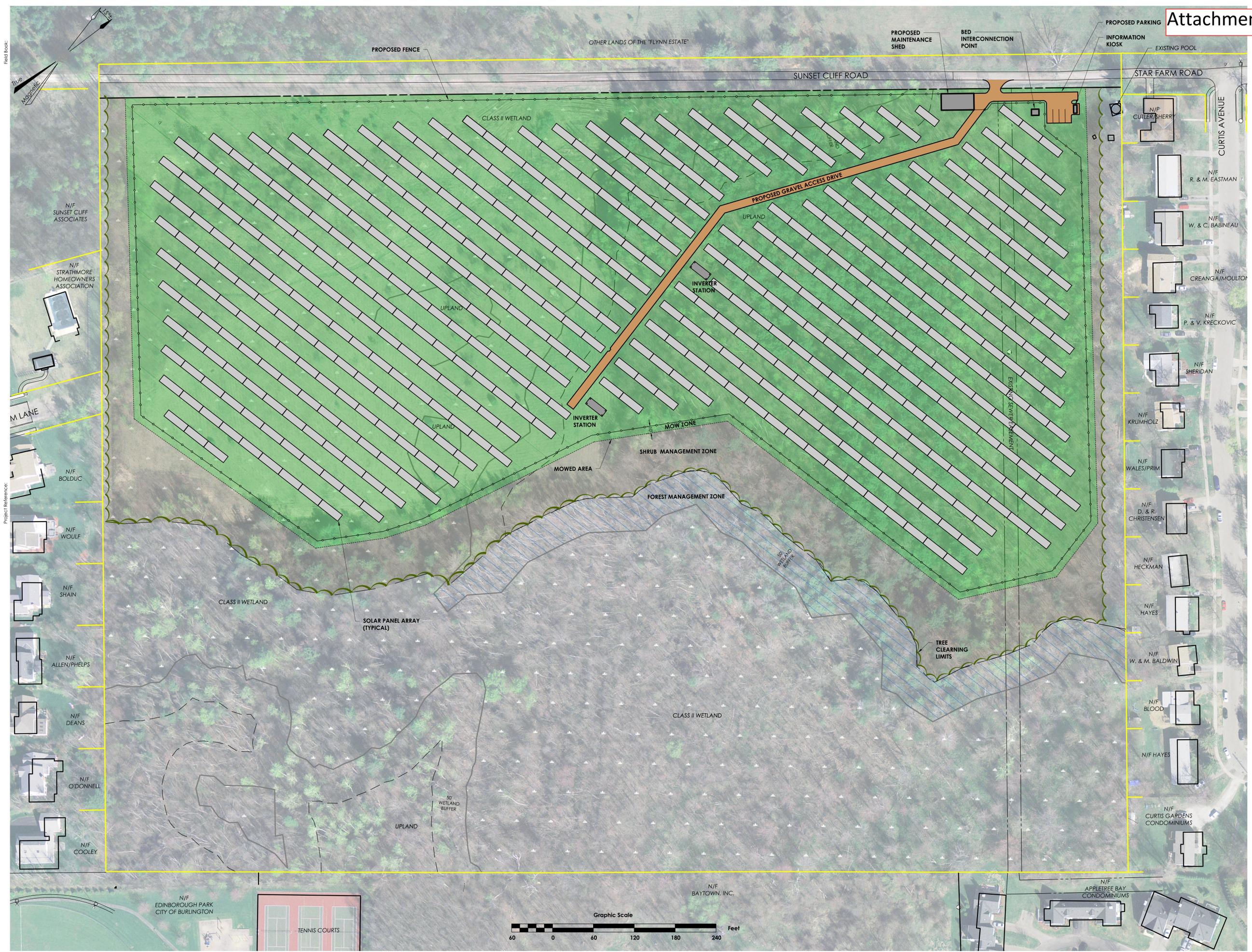


Project Title  
**South Forty Solar Farm  
 Sunset Cliff Road  
 Burlington, Vermont**

Sheet Title  
**Overall Site Plan**

Date:	02/24/2014
Scale:	1" = 60'
Project Number:	2013113
Drawn By:	RMP
Project Engineer:	JMM
Approved By:	

C2-01



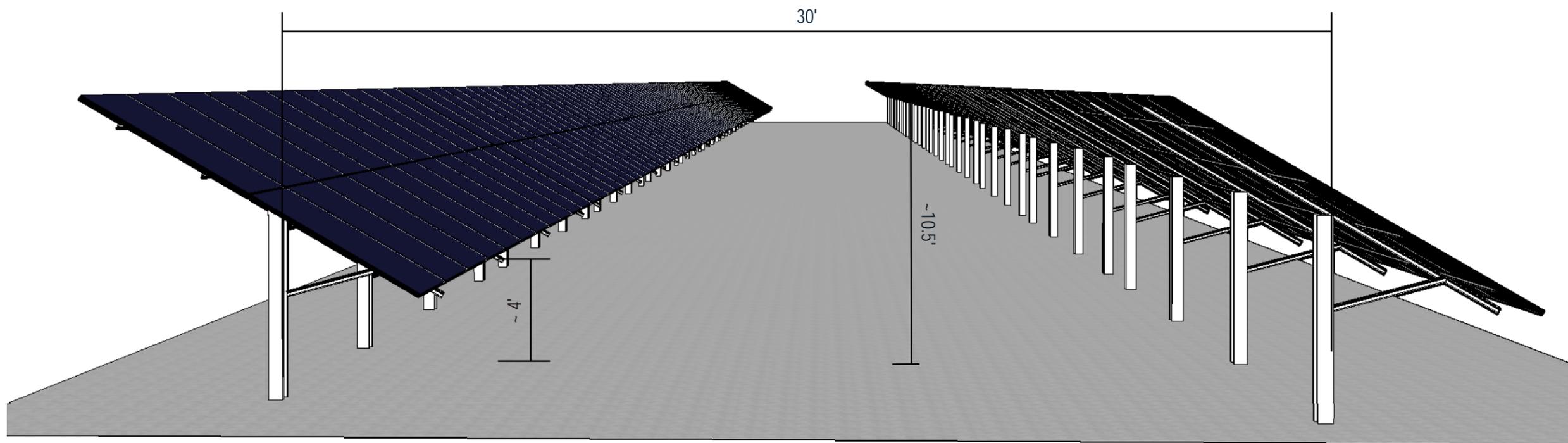
Not for Construction

L.W. SEDDON, LLC  
13 Bailey Ave.  
Montpelier, VT 05602 USA  
Tel: 802-272-7284

**Client:**  
South Forty Solar, LLC  
300 Swift St.  
S. Burlington, VT 05403

**Project:**  
South Forty Solar Farm  
Sunset Cliff Rd.  
Burlington, VT 05401

AC Capacity: 2.5 MW AC  
Array Size : 3.34 MW DC  
Annual Output = 3,750 MWH  
Module: 300 Watts  
Mounting: driven pile  
Module tilt: 30 degrees  
Azimuth: 180 degrees (True)



Typical Rack Height & Row Repeat Distance

Vers	By	Date	Changes
1	LWS	21-Feb-2014	

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**Drawing:**  
PV-A03

**Description:**  
Array Elevation, Typical

**Scale:**  
none

# ReneSola



## 156 Series Polycrystalline Solar Module

### 300W, 305W, 310W



High Module Conversion Efficiencies



Easy Installation and Handling for Various Applications



Mechanical Load Capability of up to 5400 Pa



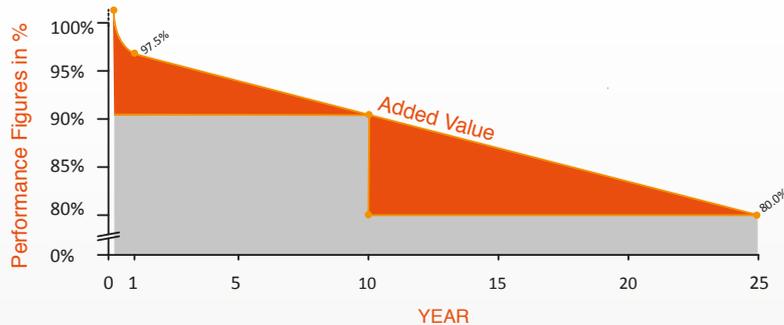
Conforms with IEC 61215:2005, IEC 61730: 2004, UL 1703 PV Standards



ISO9001, OHSAS18001, ISO14001 Certified



Application Class A, Safety Class II, Fire Rating C



**10-year**  
material & workmanship

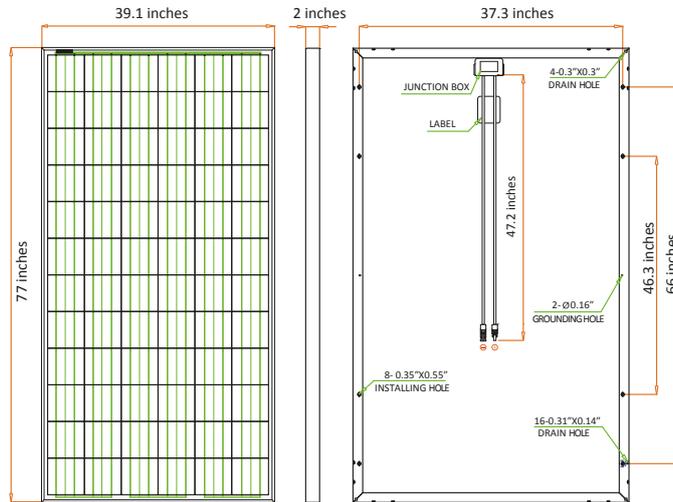
**25-year**  
linear power output



APPROVED PRODUCT

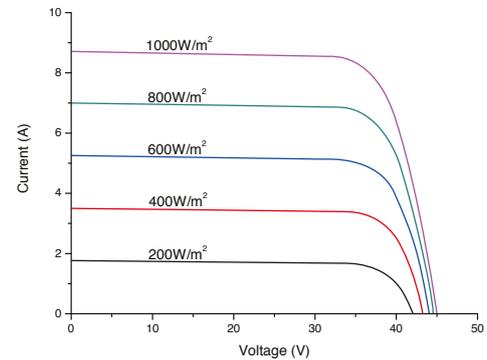


#### Dimensions



Drawing Only for Reference

#### I-V Curves



#### Varied Irradiation Efficiencies

Irradiance	200W/m <sup>2</sup>	400W/m <sup>2</sup>	600W/m <sup>2</sup>	800W/m <sup>2</sup>	1000W/m <sup>2</sup>
Efficiency	15.8%	16.2%	16.2%	16.1%	16.0%

#### Electrical Characteristics STC

	JC300M-24/Ab	JC305M-24/Ab	JC310M-24/Ab
Maximum Power (P <sub>max</sub> )	300 W	305 W	310 W
Power Tolerance	0 ~ +5W	0 ~ +5W	0 ~ +5W
Module Efficiency	15.5%	15.7%	16.0%
Maximum Power Current (I <sub>mp</sub> )	8.20 A	8.33 A	8.38 A
Maximum Power Voltage (V <sub>mp</sub> )	36.6 V	36.6 V	37.0 V
Short Circuit Current (I <sub>sc</sub> )	8.69 A	8.73 A	8.80 A
Open Circuit Voltage (V <sub>oc</sub> )	44.8 V	44.9 V	45.0 V

Values at Standard Test Conditions STC (Air Mass AM1.5, Irradiance 1000W/m<sup>2</sup>, Cell Temperature 25°C)

#### Electrical Characteristics NOCT

	JC300M-24/Ab	JC305M-24/Ab	JC310M-24/Ab
Maximum Power (P <sub>max</sub> )	222 W	226 W	230 W
Maximum Power Current (I <sub>mp</sub> )	6.67 A	6.72 A	6.80 A
Maximum Power Voltage (V <sub>mp</sub> )	33.4 V	33.6 V	33.8 V
Short Circuit Current (I <sub>sc</sub> )	7.02 A	7.04 A	7.10 A
Open Circuit Voltage (V <sub>oc</sub> )	41.9 V	42.0 V	42.1 V

Values at Normal Operating Cell Temperature, Irradiance of 800 W/m<sup>2</sup>, spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s

#### Mechanical Characteristics

Cell Type	156 x156 mm Polycrystalline, 72 (6x12) pcs in series
Glass	High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminum Alloy
Junction Box	IP65/IP67 rated, with bypass diodes
Dimension	*77 x 39.1 x 2 inches
Output Cable	12 AWG, 47.2 inches
Weight	63.9 lbs
Installation Hole Location	See Drawing Above

#### Characteristics

Temperature Coefficient of Voc	-0.30%/°C
Temperature Coefficient of I <sub>sc</sub>	0.04%/°C
Temperature Coefficient of P <sub>max</sub>	-0.40%/°C
Nominal Operating Cell Temperature (NOCT)	45°C ± 2°C

#### Packing Information

Container	20' GP	40' GP	40' HQ
Pallets per Container	10	24	24
Pieces per Container	200	480	528

#### Maximum Ratings

Operating Temperature	-40°F ~ + 185°F
Maximum System Voltage	1000VDC (EU) / 600VDC (US)
Maximum Series Fuse Rating	20A (EU) / 20A (US)

Rev No: JC/TDS/2013.02 \*Contact ReneSola for tolerance specification  
CAUTION: All rights reserved. Design and specification are subject to change without prior notice.



## FS System

### Features and Benefits

- ETL Listed
- High level of pre-assembled parts
- Proven extremely short installation time
- High quality and sustainable materials
- Easily accessible for ground and system maintenance
- Included certified engineering by professional engineer licensed in the location of the project
- Included soil tests and pull out tests on systems larger than 250 kW
- Options for in field adjustment, if needed

**The Schletter FS Racking System** has a proven worldwide product and installation history, with over 6 GW of ground mounted installations installed throughout the world with many FS installations ranking among the largest globally. Project specific system calculations and optimized material utilization address the ever increasing pressure to reduce costs in planning PV systems, taking into account balance of system (BoS). Complete structural calculations are provided for system design, while assuring compliance with current building codes and regulations.

With this established history and experience in ground mounted PV installations, the latest generation of the FS System offers a culmination of experience and the highest level of in-house pre-fabrication to date, while always maintaining the focus of making the overall cost of a PV system more competitive. **The result is an attractive system installed quickly, efficiently, and with the durability to last.**

Schletter stands behind the quality, durability, and functionality of its products and services its customers with professionalism. Because of our commitment to customer satisfaction, all Schletter systems have a voluntary 10-year warranty.

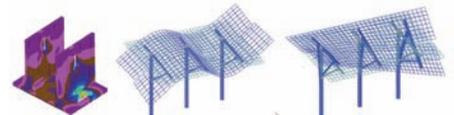
For more information, please visit [www.schletter.us](http://www.schletter.us) or call (520) 289-8700.





**Technical Data**

Material	<ul style="list-style-type: none"> <li>Fastening elements, bolts: Stainless steel 304 and 316</li> <li>Profiles (rails): Aluminum alloy 6105 T5</li> <li>High life-expectancy, high residual value, no disposal costs</li> <li>Pile driven support posts: Steel, hot-dip galvanized with a G235 process                             <ul style="list-style-type: none"> <li>- Easy plant re-powering due to modular design</li> </ul> </li> </ul>
Logistics	<ul style="list-style-type: none"> <li>Quick and simple mounting</li> <li>Maximum level of prefabrication prior to shipment</li> </ul>
Construction	<ul style="list-style-type: none"> <li>Can be installed on uneven terrain</li> <li>Simple adjustment options</li> <li>Cost optimized configurations for framed and unframed modules</li> </ul>
Accessories	<ul style="list-style-type: none"> <li>Cable channels, cable ducts</li> <li>Components for potential equalization/grounding</li> <li>Clamps for every type of module</li> <li>Fastening systems for large laminate modules (OptiBond system)</li> </ul>
Calculations	<ul style="list-style-type: none"> <li>100% code compliant designs for any locality</li> <li>Third-party structural PE, stamped drawings and calculations</li> <li>Individual system structural calculations based on geotechnical report</li> <li>Individual system design calculations based on regional load values</li> <li>Design loads according to IBC 2006 or 2009</li> <li>Patented profile geometries with optimum material utilization</li> <li>Verification of all construction components based on FEM-calculation</li> <li>Earthquake simulation, optional</li> </ul>
Available Third-Party Services	<ul style="list-style-type: none"> <li>Geotechnical soil investigation and analysis</li> <li>Ramming of foundations</li> <li>Optional: rack mounting</li> <li>Optional: complete module mounting</li> <li>EPC services</li> <li>PPA formation</li> </ul>
Terrain maintenance	<ul style="list-style-type: none"> <li>Simple terrain maintenance due to single support                             <ul style="list-style-type: none"> <li>- Specification of module height above ground possible</li> </ul> </li> </ul>
Grounding, Potential equalization	<ul style="list-style-type: none"> <li>Grounding options available</li> <li>Components for the internal potential equalization</li> </ul>
Warranty and Certifications	<ul style="list-style-type: none"> <li>10-year warranty, optional 20-years</li> </ul>



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## PowerStation™ TX

### Turnkey Integration Solution for MW-Scale Projects

The PowerStation TX from Advanced Energy is a fully integrated power conversion solution for MW-scale PV projects that accepts PV DC inputs and provides medium voltage AC output. The PowerStation TX is built around the Advanced Energy line of TX inverters which offer exceptional reliability and a 20+ year operating life. The PowerStation TX also offers industry-leading efficiency by combining a high efficiency medium voltage transformer with Advanced Energy's high efficiency inverters. This combination of reliability, long life, and optimized energy harvest makes the PowerStation TX the right choice to maximize return on investment in large PV systems.

The pre-wired, outdoor-rated solution reduces project engineering costs, accelerates project schedules, and significantly decreases the cost of on-site labor and installation. The entire package is designed to be pier mounted to further simplify installation. Pad mounting is also available on certain configurations.

The PowerStation TX includes inverters, medium voltage transformer, auxiliary power, and other customer components such as data monitoring and control equipment, all pre-wired and factory tested. The pad mount transformer with integrated medium voltage switch is a compact and cost-effective choice that enables low-cost loop-feed installations and minimizes the need for individual pieces of medium voltage switchgear. The flexible design offers several configuration options to meet local utility requirements and installation preferences.

AE's integrated TX inverters are backed with an industry leading 10-year nationwide warranty with optional, comprehensive 20-year warranty. The balance of the solution carries a 1-year warranty with option to extend to five years. The complete PowerStation TX is supported by the most responsive service and support team in the business.



#### System Optimization and Management

- Full system application engineering support
- Leverage AE's strategic partnerships with equipment suppliers and integrators
- Single point of contact for project coordination and management
- Job specific composite drawings and project documentation

#### Superior Reliability

- Low inverter parts count reduces potential failure points
- Increased availability with >99% monitored fleet availability
- Redundant cooling system with Smart Air Management™
- Card cage circuit board system minimizes electronic interconnections and enables fast service
- Complete PowerStation TX solution factory pre-wired and tested, reducing potential for errors

#### Significant Financial Benefits

- Factory installation and wiring greatly reduces field labor
- Optional pier mount installation reduces pad costs and simplifies conduit entry
- High efficiency and long service life maximize energy harvest every day for 20+ years
- Integration solution reduces project management, engineering costs, and shortens project construction cycle
- Optional enclosure protects from vandalism without additional fencing or other on-site construction

## PowerStation™ TX

### PowerStation TX Solution

- Fully assembled, pre-wired, tested, and ready to connect
- Includes inverters, medium voltage transformer, distribution switchboard, auxiliary power, and other custom components required to meet job specific requirements
- Open and enclosed options available

### Monitoring and Communications (Optional)

- Revenue grade metering
- Subcombiner monitoring
- Central communications box for single point access to all PowerStation data
- All control wiring from inverters and monitoring devices to central comm box, factory installed and tested
- Power supply, RS485 port, and Ethernet switch included for easy connection to SCADA or third party monitoring system

### Medium Voltage Step-up Transformer

- Integrated medium voltage load-break switch
- Loop feed to minimize medium voltage connections to the grid
- Selectable output up to 35 kV AC
- Multiple protection and switching options
- Biodegradable FR3 fluid

### Switchboard

- 480/277 V 3 phase, 4 wire
- Inverters are pre-wired to the switchboard and combined into single output to transformer
- Optional breakers for tracker power and other onsite loads
- Optional main circuit breaker and revenue grade meter

### Engineered Cooling System

- Inverter Smart Air Management™ complements the PowerStation TX cooling system
- Enclosure heat removed using a high-efficiency exhaust fan

### Shown with (2) 500 kW Commercial Inverters\*

- Separate DC in to each inverter
- 97% CEC Efficiency
- 310-600 Volt MPPT Range

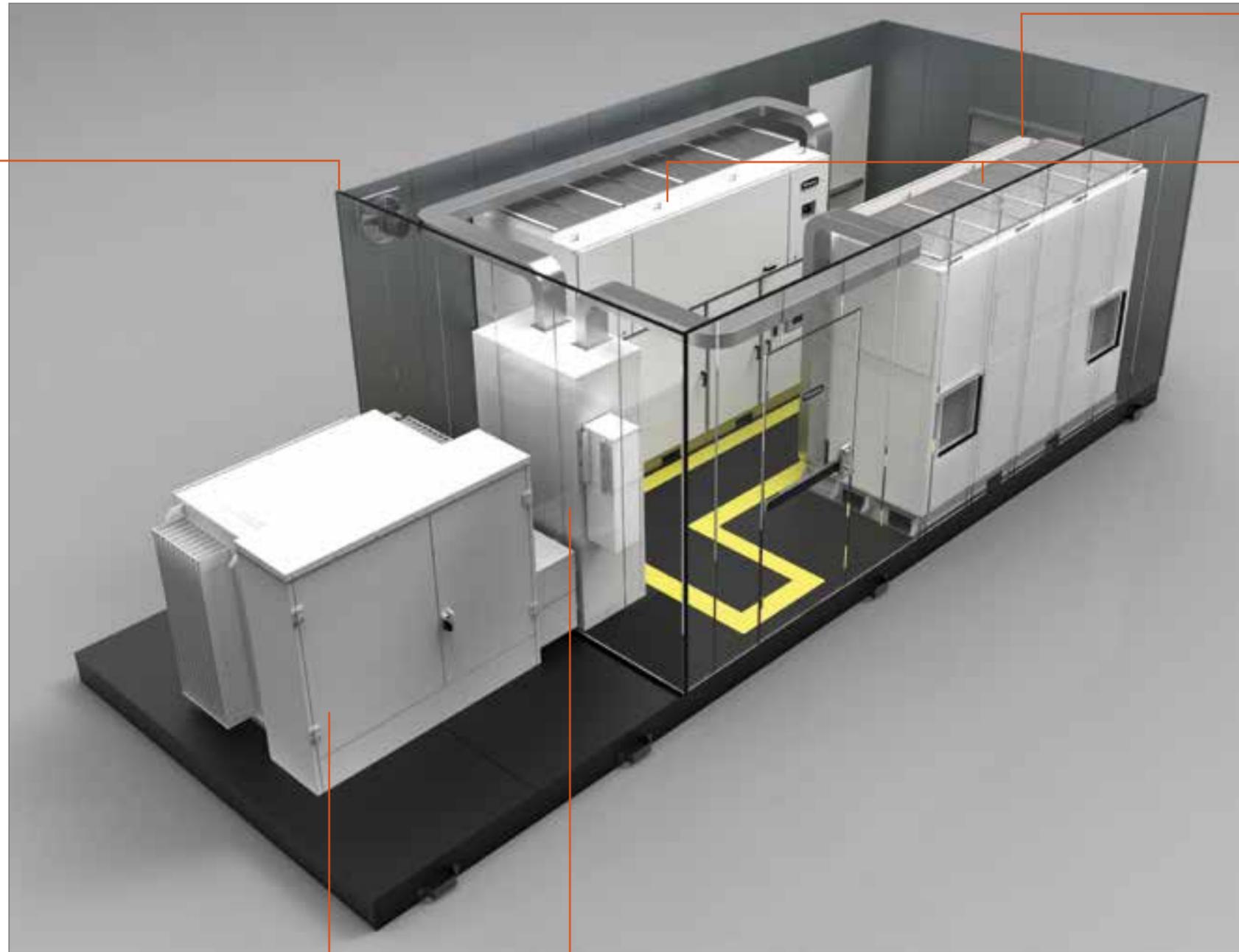
\* Additional inverter configurations available

### Pier Mount

- Easy access to AC and DC conduits simplifies installation
- Eliminates need to grade and level pad site and stub in conduit
- Reduces installation time and expense
- Pad mount option available for some configurations



Pier mount PowerStation TX





# ENVIROTEMP® FR3™ FLUID

## DESCRIPTION

Envirotemp® FR3™ fluid is a Fire Resistant Natural Ester based dielectric coolant specifically formulated for use in distribution transformers where its unique environmental, fire safety, chemical, and electrical properties are advantageous.

Envirotemp FR3 fluid is formulated from edible seed oils and food grade performance enhancing additives. It does not contain any petroleum, halogens, silicones or any other questionable material. It quickly and thoroughly biodegrades in both soil and aquatic environments. The fluid tested non-toxic in aquatic toxicity tests. It is tinted green to reflect its favorable environmental profile.

Envirotemp FR3 fluid has an exceptionally high fire point of 360°C and flash point of 330°C. It has the highest ignition resistance of less-flammable fluids currently available. It is referred to as a High Fire Point or "Less-Flammable" fluid, and is Listed as a Less-Flammable Dielectric Liquid by Factory Mutual and Underwriters Laboratories for use in complying with the National Electric Code® (NEC®) and insurance requirements.

Envirotemp FR3 fluid is compatible with standard transformer insulating materials, components and with fluid processing equipment and procedures. It demonstrates improved thermal characteristics with a viscosity closer to conventional transformer oil, superior dielectric strength in new and continued service applications, and excellent chemical stability over time.

Because of its excellent environmental, fire safety and performance characteristics applications for Envirotemp FR3 fluid have expanded into a variety of other equipment, including sectionalizing switches, transformer rectifiers, electromagnets, and voltage supply circuits for luminaries. Other potential applications under study include voltage regulators, high voltage cables, and power substations. The fluid is also used in retrofill applications for other fluid filled distribution equipment.

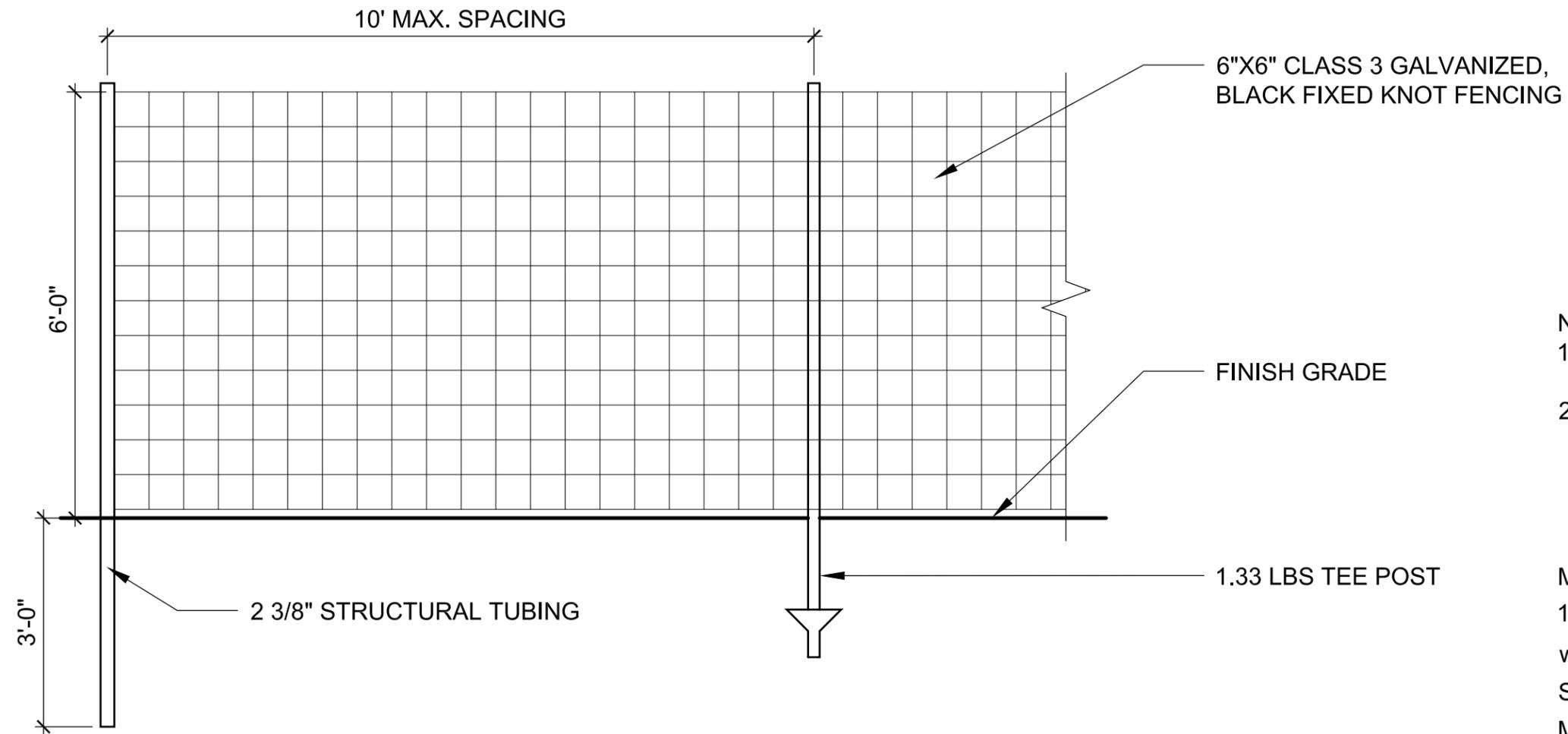
## TYPICAL INITIAL ENVIROTEMP FR3 FLUID PROPERTIES

Property	Value	Test Method
<b>Electrical</b>		
Dielectric Strength	56 kV @ 25°C (0.080" gap) 47 kV @ 25°C	ASTM D1816 ASTM D877
Relative Permittivity [Dielectric Constant]	3.2 @ 25°C	ASTM D924
Dissipation Factor [Power Factor]	0.05% @ 25°C	ASTM D924
Volume Resistivity	30 X 10 <sup>12</sup> Ω-cm @ 25°C	ASTM D1169
Impulse Strength (Sphere to Sphere)	226 kV @ 0.15" gap	ASTM D3300
Gassing Tendency	-79 (µL/min.)	ASTM D2300
<b>Physical and Chemical</b>		
Specific Gravity	0.92 @ 25°C	ASTM D1298
Interfacial Tension	27 mN/m @ 25°C	ASTM D971
PH	5.8	EPA 9045C
Neutralization (Acid) Number	0.022 mg KOH/g	ASTM D974
Kinematic Viscosity	33 cSt @ 40°C 8 cSt @ 100°C	ASTM D445
Moisture Content	20 mg/kg	ASTM 1533B
Percent Saturation of Moisture	1 - 2%	CPS Method
Air Solubility	16% @ 25°C @ 1 atm.	ATSM D2779
Appearance	Clear, Light Green	ASTM D1524
Color	L 0.5	ASTM D1500
<b>Thermal</b>		
Flash Point (Closed Cup)	316°C	ASTM D93
Flash Point (Open Cup)	330°C	ASTM D92
Fire Point (Open Cup)	360°C	ASTM D92
Pour Point	-21°C	ASTM D97
Thermal Conductivity	4.0 X 10 <sup>-4</sup> cal/(cm • sec • °C) @ 25°C	CPS Method
Specific Heat	0.45 (cal/gm/°C) @ 25°C	ASTM D2766
Coefficient of Expansion	7.4 x 10 <sup>-4</sup> /°C @ 25°C	CPS Method
Heat Capacity	2.10 @ 50°C 2.39 @ 100°C	ASTM E1269
<b>Environmental Properties</b>		
BOD/COD Ratio	45%	APHA SM5210B
Aquatic Biodegradation	100%	EPA OPPTS 835.3100
Acute Toxicity to Trout Fry	Zero Mortality to Test End Point	OECD G.L. 203

The typical properties shown above are for new fluid prior to factory shipment. These properties are subject to change without notice. Contact CPS Dielectric Fluids Products for recommended acceptance values. Ask for Envirotemp FR3 fluid Specification Guideline, Bulletin 97080.

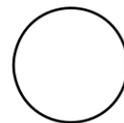
**Bulletin 00092**  
**Product Information**  
**June, 2001**

(Supersedes May, 2001)



NOTE:  
 1. ALL FENCING COMPONENTS TO BE  
 BEZINAL + PAINT ADVANCED COATED.  
 2. INSTALL PER MANUFACTURER'S  
 RECOMMENDATIONS

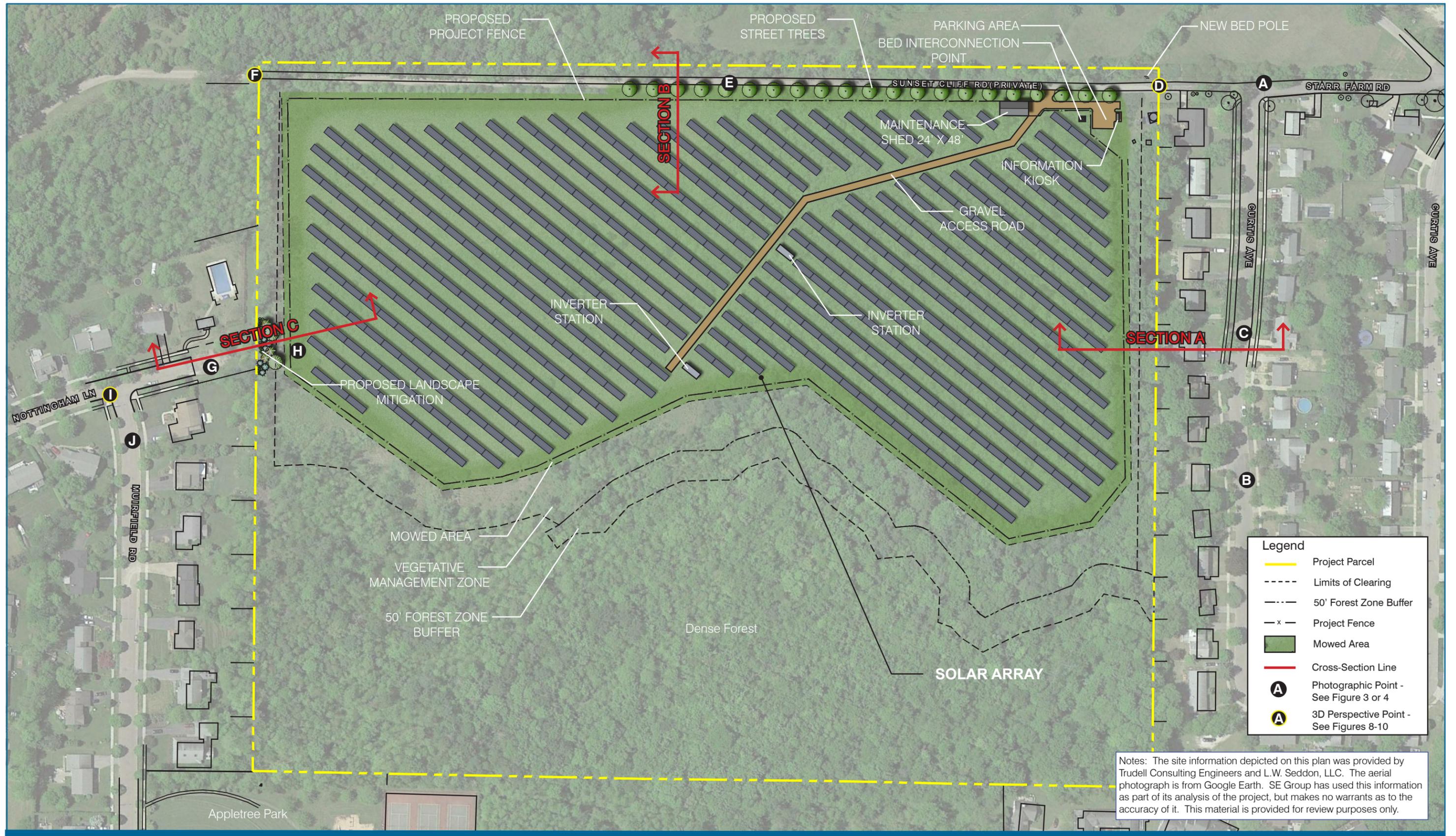
MANUFACTURER: BEKAERT  
 1-800-241-4126  
[www.fencing.bekaert.com](http://www.fencing.bekaert.com)  
 Solidlock - Fixed Knot Game Fence  
 MODEL: 136261  
 COLOR: BLACK



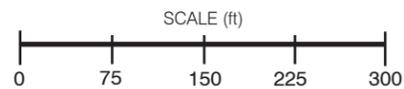
**6' Solidlock FENCE**

SCALE 1/2" = 1'-0"





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**SITE PLAN | Figure 2**

February 2014



A - VIEW LOOKING SOUTH AND WEST FROM STARR FARM ROAD TOWARDS PROJECT SITE DOWN SUNSET CLIFF ROAD



B - VIEW LOOKING NORTH AND WEST UP CURTIS AVENUE PROJECT SITE OBSCURED FROM THIS VANTAGE POINT



C - VIEW LOOKING WEST FROM CURTIS AVENUE FILTERED VIEWS OF PROJECT SITE THROUGH RESIDENCES



D - VIEW LOOKING SOUTH AND WEST DOWN SUNSET CLIFF ROAD FROM NEAR THE PROPERTY BOUNDARY TOWARDS THE PROJECT SITE



E - VIEW LOOKING SOUTH TOWARDS PROJECT SITE AND STRATHMORE DEVELOPMENT FROM SUNSET CLIFF ROAD



F - VIEW LOOKING NORTH AND EAST DOWN SUNSET CLIFF ROAD FROM NEAR THE PROPERTY BOUNDARY TOWARDS THE PROJECT SITE

All Photographs taken by SE Group using a Sony SLT A55V camera with a 52mm focal length (35 mm equivalent) on 01/22/2014 from 9:45- 11:00 AM

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**SITE PHOTOGRAPHS | Figure 3**

February 2014



G - VIEW LOOKING NORTH FROM THE END OF NOTTINGHAM LANE TOWARDS PROJECT SITE NEXT TO STRATHMORE POOL AREA



H - VIEW LOOKING SOUTH FROM WITHIN PROJECT SITE TOWARDS STRATHMORE RESIDENCE



I - VIEW LOOKING SOUTH FROM CORNER OF MUIRFIELD ROAD AND NOTTINGHAM LANE TOWARDS PROJECT SITE NEAR STRATHMORE POOL AREA



J - VIEW LOOKING NORTH TOWARDS PROJECT SITE FROM MUIRFIELD ROAD

All Photographs taken by SE Group using a Sony SLT A55V camera with a 52mm focal length (35 mm equivalent) on 01/22/2014 from 9:45- 11:00 AM

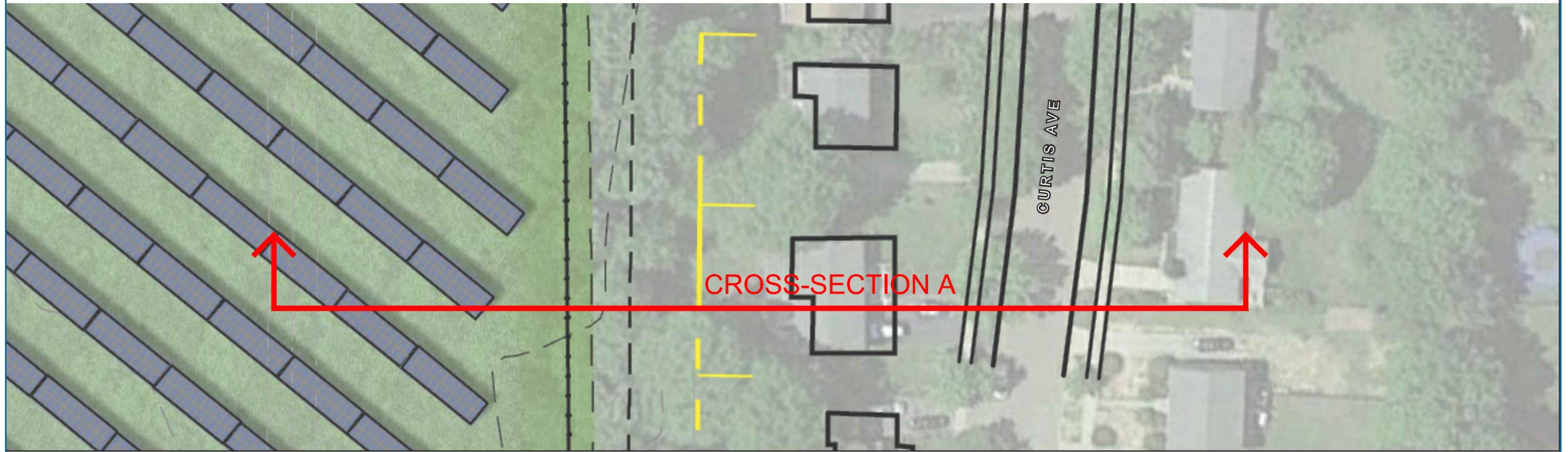
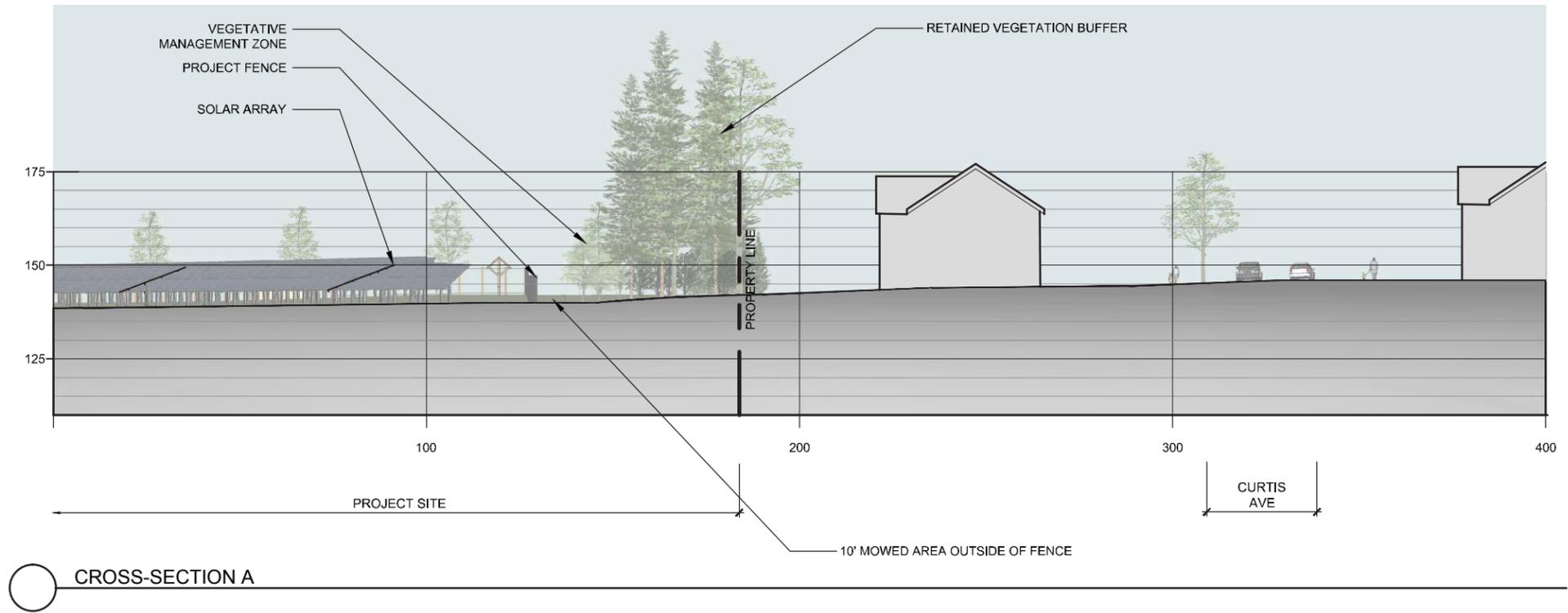
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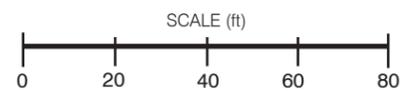
South Forty Solar Farm

**SITE PHOTOGRAPHS | Figure 4**

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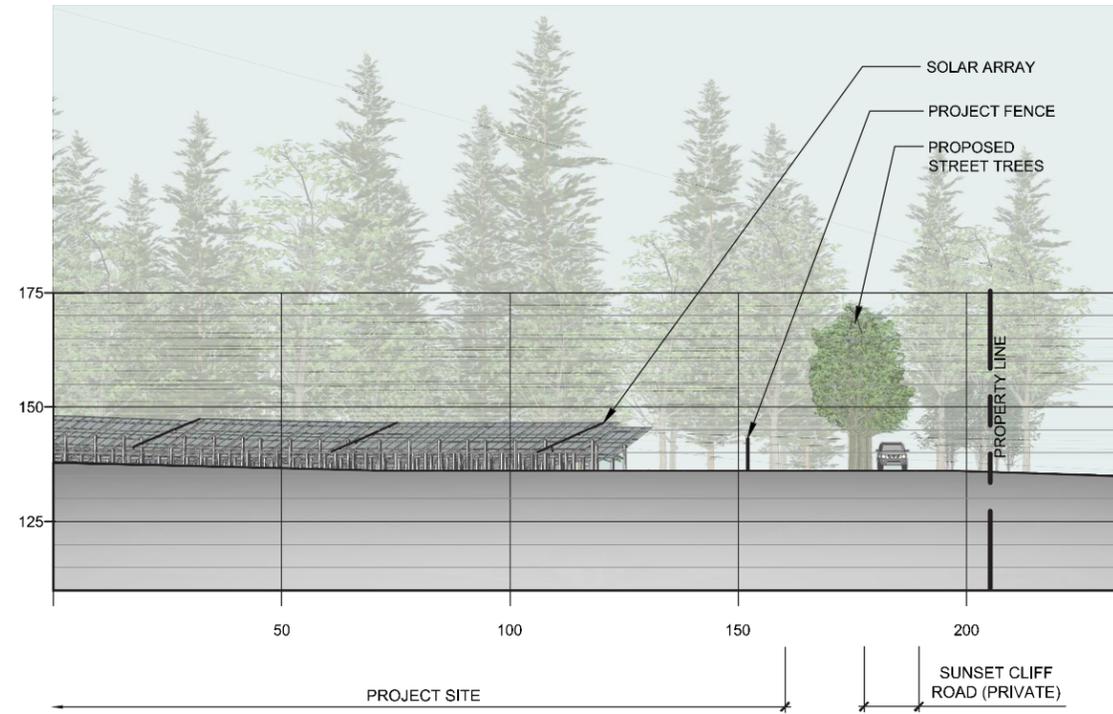
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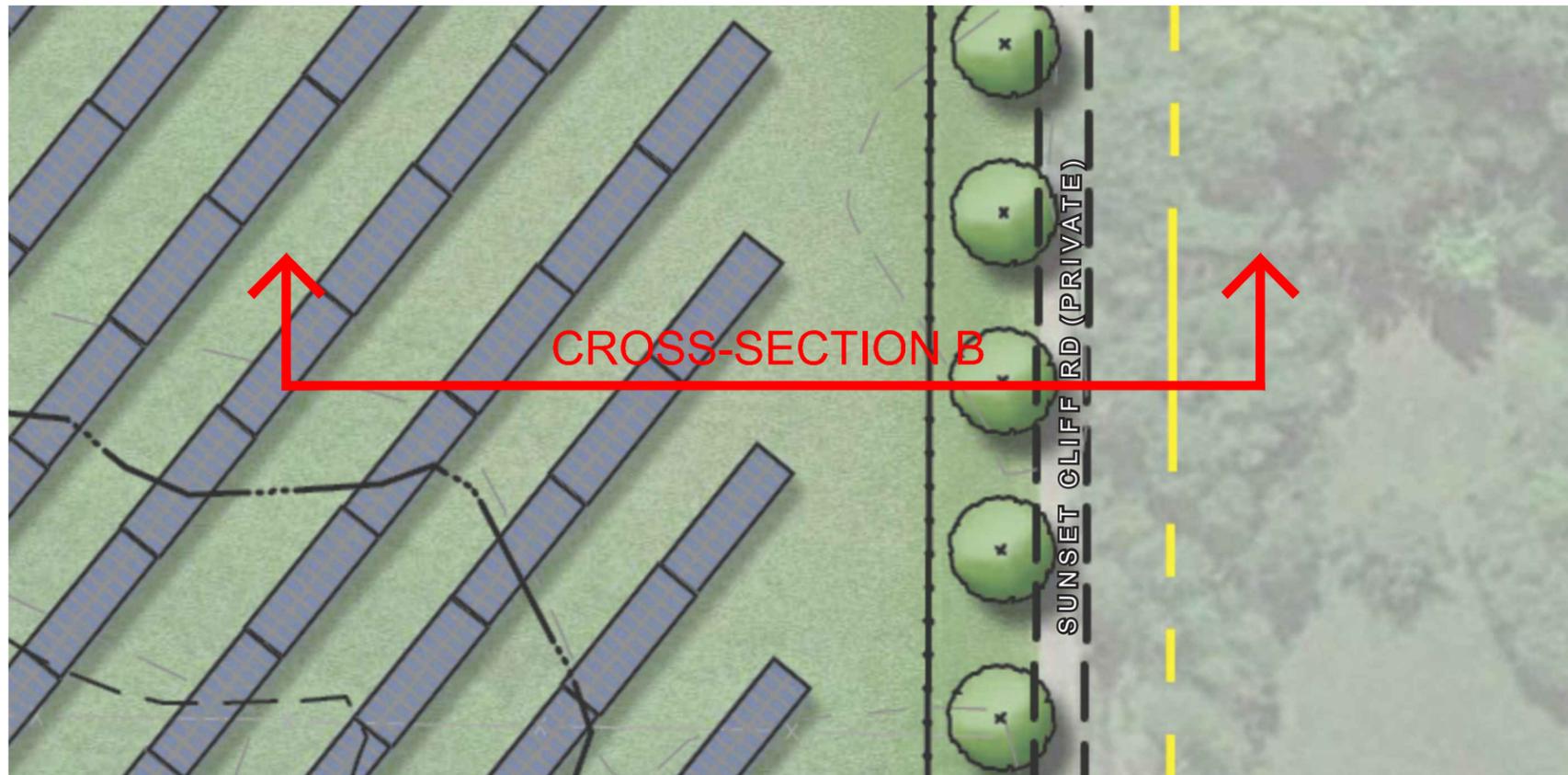
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CROSS SECTION A | Figure 5

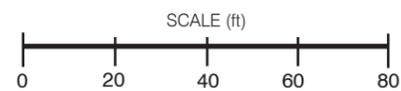
February 2014



CROSS-SECTION B



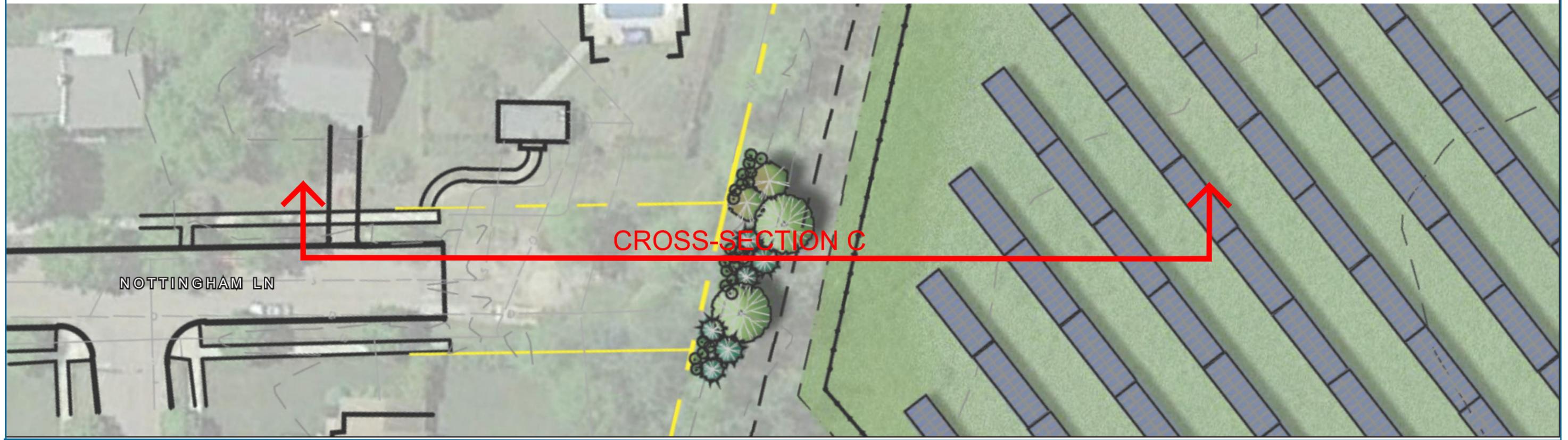
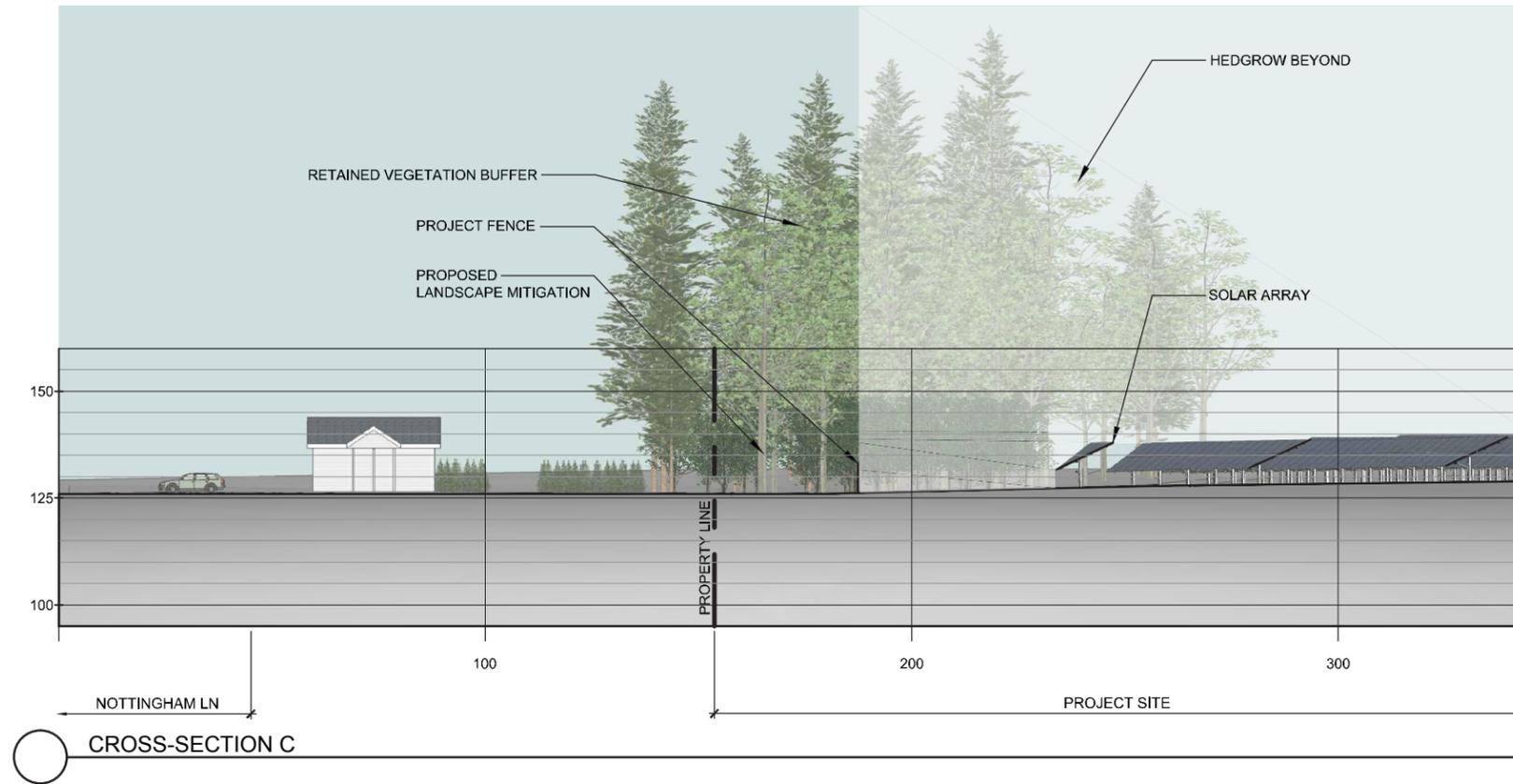
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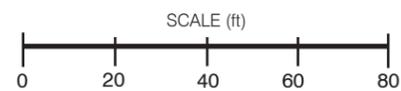
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CROSS SECTION B | Figure 6

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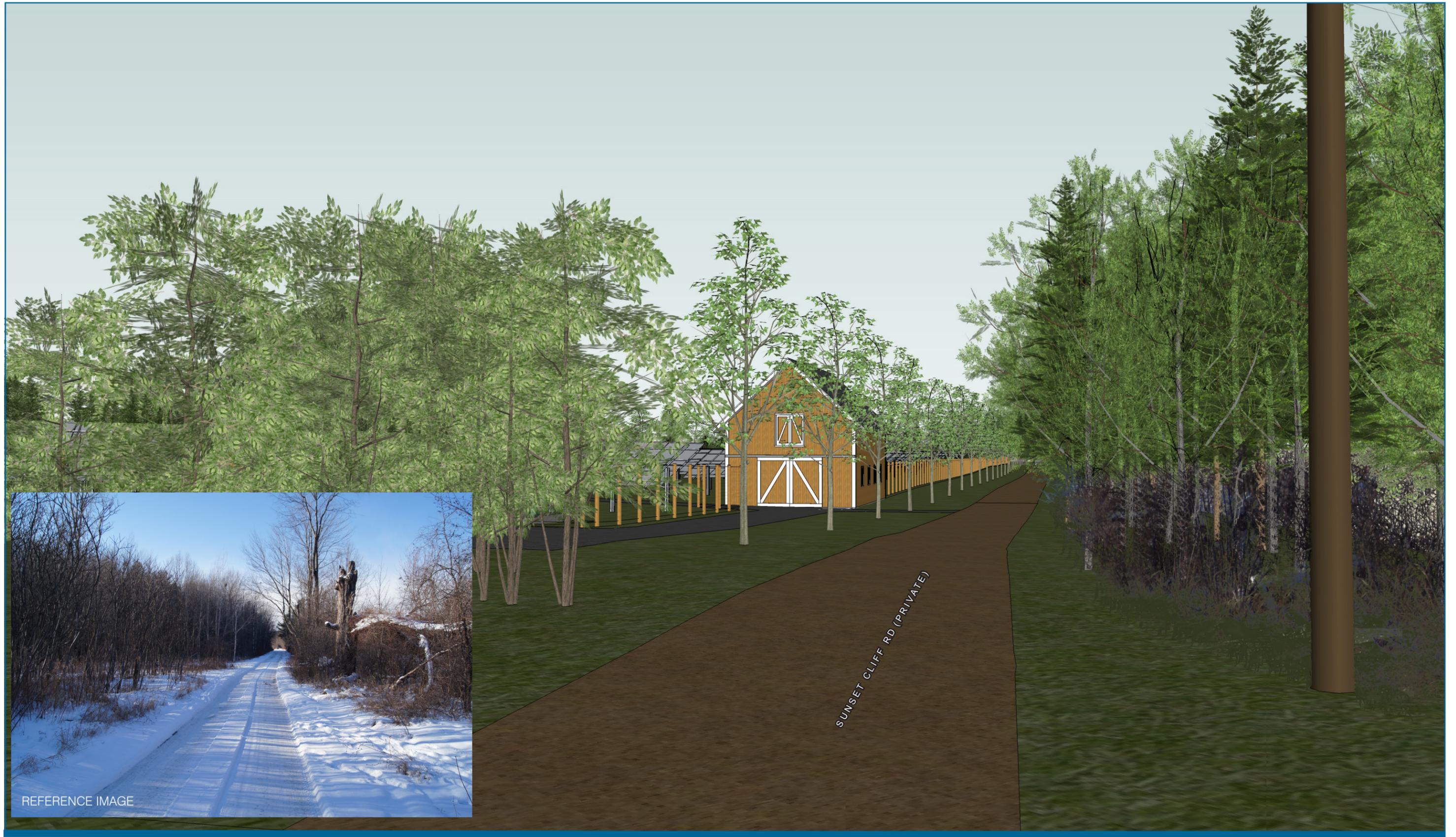
Prepared By:



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CROSS SECTION C | Figure 7

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**3D PERSPECTIVE D | Figure 8**

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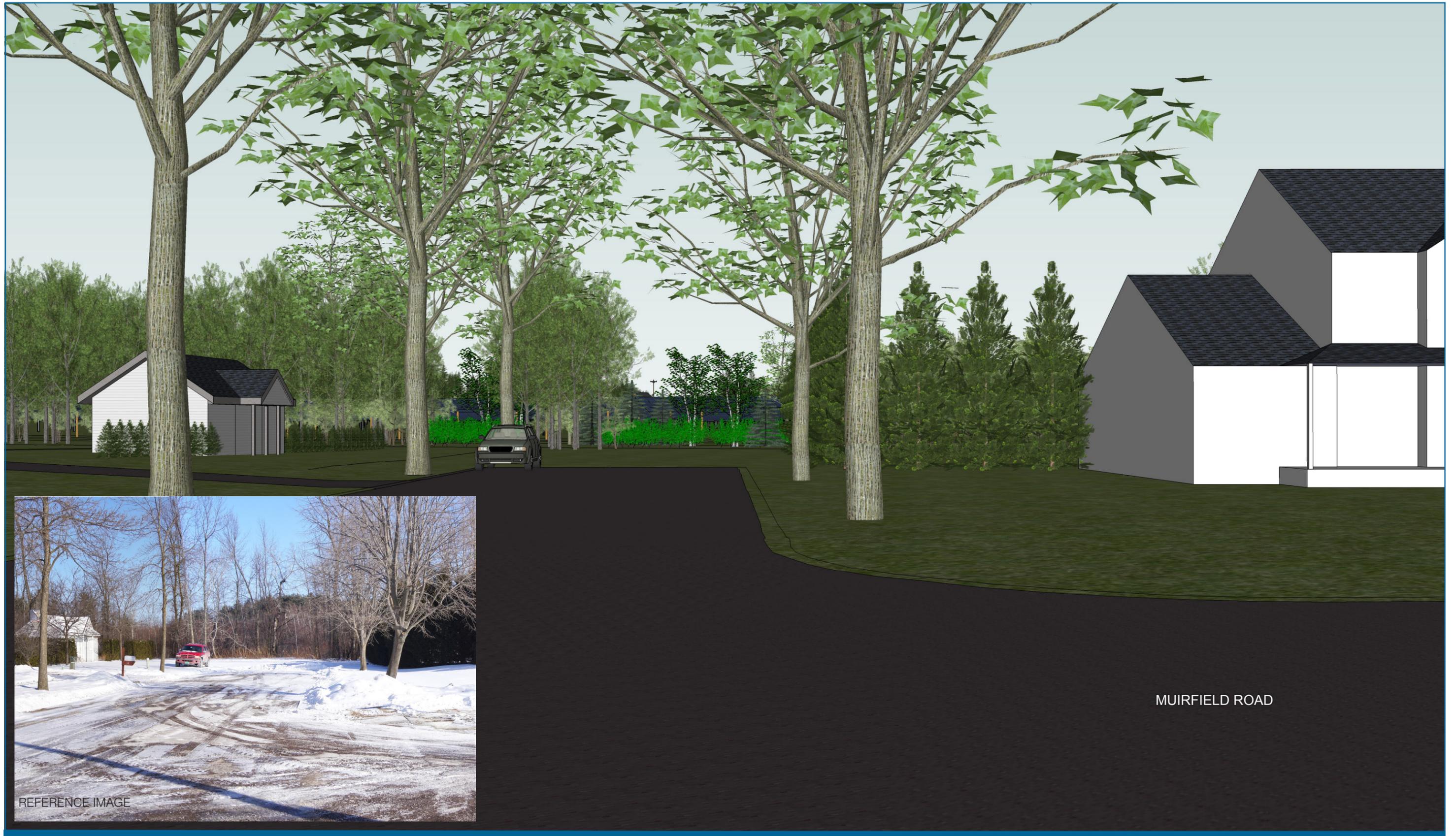
Prepared By:



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**3D PERSPECTIVE F | Figure 9**

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**3D PERSPECTIVE I | Figure 10**

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