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***SENT VIA EMAIL to jschmitt@duanesburg.net, MDeffer@duanesburg.net, tbakner@woh.com, and Dale@duanesburg.net.***

Planning Board
Town of Duanesburg
5853 Western Turnpike
Duanesburg, NY 12056

**RE: Amp Responses to August 19th Meeting Questions**
Oak Hill 1 and Oak Hill 2 Solar and Energy Storage Projects

Dear Chairman Schmitt,

Thank you for providing AMP Solar Development Inc. ("Amp") the opportunity to present at the August 19, 2021 Town of Duanesburg Planning Board Public Hearing. Before and during the hearing, concerned citizens raised many questions regarding the Oak Hill Solar 1, LLC ("Oak Hill 1") and Oak Hill Solar 2, LLC ("Oak Hill 2") solar and battery energy storage projects. Amp is using this letter to provide written responses to questions regarding the projects.

***What Has Changed from the Original September 2019 approval to now?***

In September 2019, the Town of Duanesburg Planning Board approved the Oak Hill 1 and Oak Hill 2 solar and battery energy storage projects by issuing a Resolution Approving Special Use Permit, Subdivision and Site Plan for the Eden Renewables Oak Hill Solar Energy Projects – 1206 Oak Hill Road. It was also determined that the renewable energy projects will not have a significant adverse impact on the environment.

Modifications to the approved Oak Hill 1 and Oak Hill 2 projects have been proposed to enhance project safety and performance. The design updates will primarily impact two site features: the access road and battery energy storage system ("BESS").

The previously approved access road will be extended, and additional turnaround areas have been proposed. These changes will make it easier for electricians and safety personnel to navigate the site.

The battery energy storage system has been modified from the decentralized, distributed technology, composed of approximately forty batteries spread throughout the two projects that was approved in 2019, to a centralized technology that is more common today. Battery energy storage technology has advanced significantly since 2019, and Amp desires to use the newer, safer technology with more advanced safety features. Additionally, the size of the energy storage system will decrease from the previously approved approximately 11.78 megawatt hours to 9.0 megawatt hours per project. The proposed modifications will make the battery energy storage system smaller and safer.

The centralized energy storage design will be compromised of four batteries (two batteries for each project) in steel enclosures with built-in safety controls. The enclosures are equipped with a fire detection, suppression, and alarm system, redundant thermal controls (dual-forced air HVAC), explosive gas detection, active ventilation, and other safety features. In addition, the batteries are digitally monitored 24/7 down to the cell level in real-time to detect any system abnormalities. Amp is the long-term owner of its solar and energy storage projects and views system safety as paramount.

Changes to the access road and energy storage design will enhance project safety and performance. However, the proposed modifications do not deviate significantly from the use and design previously reviewed and approved. In addition to the access road and energy storage changes, the project will utilize newer, more efficient solar panels. The revised solar panel selection will enable a reduction to the project footprint.

## ***Battery Questions***

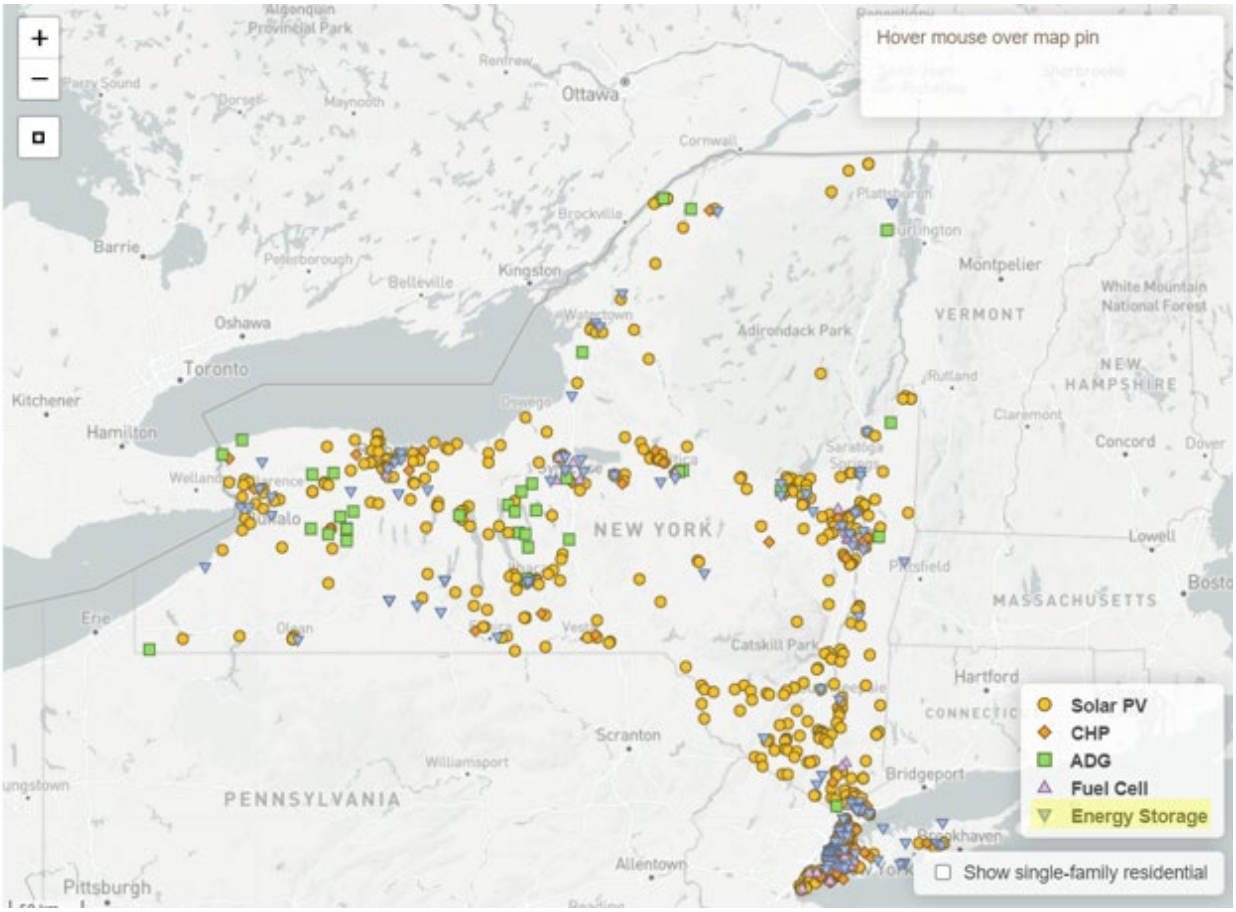
*Amp proposed to utilize a Powin Energy ("Powin") battery energy storage product. Battery technical features and specifications have previously been submitted to the Planning Board. All information provided below is specific to the Powin Energy BESS product.*

### **Battery Energy Storage Deployment in Rural Areas**

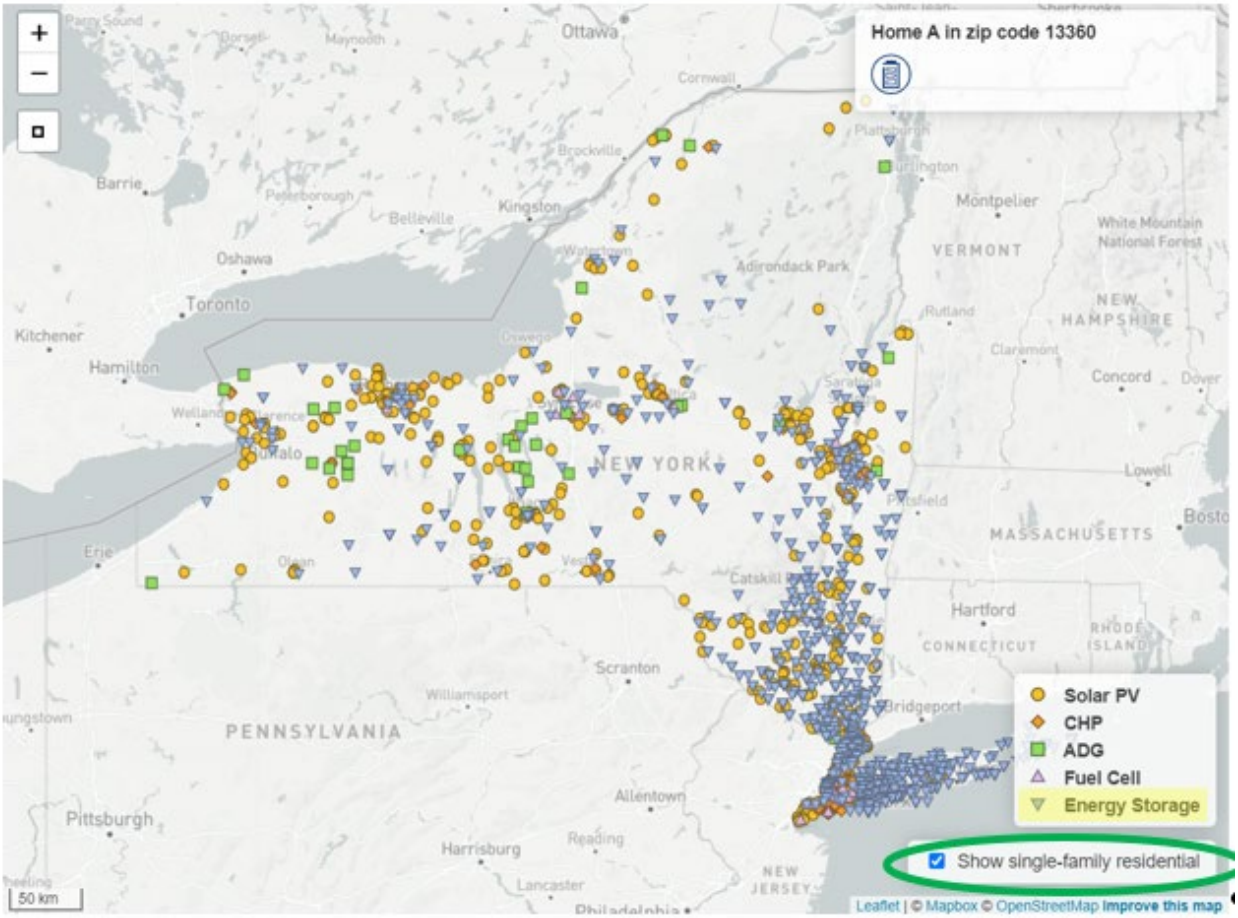
In 2019, New York passed the nation-leading Climate Leadership and Community Protection Act (Climate Act), which codified some of the most aggressive energy and climate goals in the country. Specific objectives include 70% Renewable Energy by 2030, 100% Carbon-free Electricity by 2040, and 85% Reduction in GHG Emissions from 1990 levels by 2050. Energy storage will be crucial to achieving these ambitious targets.

According to NYSERDA, "Energy storage will play a crucial role in meeting these our State's ambitious goals. Storage will help to integrate clean energy into the grid, reduce costs associated with meeting peak electric demands, and increase efficiency. Additionally, energy storage can stabilize supply during peak electric usage and help keep critical systems online during an outage." Recognizing energy storage's importance to the energy transition, New York implemented goals of deploying 3,000 MW of Energy Storage by 2030 and 1,500 Megawatts (MW) of energy storage by 2025.

Energy storage systems are being constructed across New York to support the state's clean energy goals. Deployments are occurring in both rural and urban areas. As of July 30, 2021, NYSERDA's Retail and Bulk Energy Storage Incentive Program was tracking over 80 approved projects with an energy capacity over 1 MWh. These projects were spread across over 25 counties. Below is a NYSERDA map showing the location of distributed energy resources.




The proliferation of energy storage systems is further expanded if residential energy storage systems are considered.




**How is the BESS building constructed?**

The BESS building is a preassembled steel enclosure with a built-in fire detection, suppression, and alarm system and thermal controls (dual redundant HVAC). The enclosure is placed on an engineered foundation with a grounding grid. A crane is typically used to lift the enclosure onto the foundation. After being positioned on the foundation, the proper electrical terminations/connections are completed, and the fire suppression and HVAC systems are commissioned. Once the fire suppression and HVAC systems are functioning correctly, the battery stacks are installed and connected inside the enclosure. Crews with appropriate safety training and experience will perform all work.

**Is it a tin shed or masonry block?**

The battery enclosure is made of steel.

**Is the space conditioned to provide cooling in summer?**

Yes. Each battery enclosure includes a wall-mounted HVAC system at each end of the container (dual forced-air HVAC for system redundancy). Cold

HVAC air is ducted directly to the intake fans for each group of batteries. The enclosure also contains technology to monitor and control humidity.

**Is the connected electrical apparatus installed in its own conditioned and protected enclosure, or in close proximity to the batteries?**

The connected electrical switchgear will be located in a section of the battery enclosure. The batteries are housed in unitized stacks within the steel enclosure (we have proposed having 4 separate steel enclosures). The enclosures are equipped with a fire detection, suppression and alarm system, redundant thermal controls (dual-forced air HVAC), explosive gas detection, active ventilation, and other safety features.

Fire suppression systems are placed directly over every individual stack of batteries. The battery stacks are contained within steel structures to separate system components as an additional thermal barrier. All the enclosures have the appropriate National Fire Protection Association and Underwriter Laboratory (global safety certification company) certifications and approvals. Both the batteries and the enclosures have separate safety certifications. The other electrical equipment, such as power converters and transformers, will be located on separate foundations.

**Is the battery area adequately ventilated to remove potentially explosive gases that are generated from charging cycles?**

During normal operation, the charging cycles will not generate any explosive gases. In the very unlikely event of a thermal runaway, combustible gases can be generated. The system is adequately ventilated all the time to remove potentially explosive gases.

Hydrogen is the primary off-gas released during thermal runaway events. The enclosure contains a highly sensitive hydrogen detection system to detect if dangerous levels of explosive gas build up. Two separate hydrogen sensors are placed at strategic locations throughout the enclosure and can detect hydrogen at levels significantly below the lower explosive limit. If hydrogen is detected, the HVACs enter emergency ventilation mode, and the off-gas alarm is activated. The gas detection and ventilation systems are backed up by an uninterruptible power supply.

A gas sample port is built into the enclosure as an additional safety precaution. In an emergency situation, the concentration of explosive gases must be tested through the gas sample port before opening an enclosure door.

**Is the BESS building protected by fire and smoke detection systems?**

Yes, the BESS enclosures are equipped with a fire detection, suppression, and alarm system. Five heat detectors and five smoke detectors are placed

throughout the enclosure to enhance system sensitivity and redundancy. Additionally, the batteries are digitally monitored 24/7 in real-time to detect any abnormalities in system performance that could develop into dangerous thermal events. If any potentially unsafe conditions are detected, mitigation systems are automatically initiated, and warnings are sent through the Alert Management System. The system offers real-time temperature and voltage monitoring down to the cell level (building block for the system architecture). These measurements are taken multiple times a second and automatically shut down the system if abnormalities are detected.

Ground fault detection is also monitored in real-time through the digital control system.

**Do those systems provide remote alert and annunciation to of/site personnel and a fire brigade?**

The systems are remotely monitored 24/7 in real-time, and alerts are provided if any system abnormalities are detected. The operations team can dispatch the local fire department if a fire is detected. The remote notification system is backed up by an uninterruptible power supply (UPS).

**Is the BESS building and/or battery banks protected by a fire suppression system?**

Yes. Fire suppression canisters are strategically placed above every stack of batteries within the steel enclosure. The system relies on a clean agent fire suppression system designed for enclosed spaces, such as the battery enclosure. The fire suppression system has an uninterruptible power supply (UPS) backup. The battery system will use a lithium iron phosphate battery chemistry, which is the safest available lithium iron chemistry. Additionally, the batteries have received third-party safety certifications from organizations such as Underwriters Laboratories (UL).

**Does the system design allow for continuing operation of the facility, at full or reduced capacity, if theBESS becomes inoperative?**

If the battery becomes inoperative, the battery operation will cease. However, similar to most other equipment, the batteries will degrade over their lifetime, and their capacities will reduce over the years. The battery is designed to continue operating at a reduced capacity as the system degrades.

**What is the procedure and frequency for battery maintenance and testing? Are records maintained and available for review?**

Powin Energy (the battery supplier) is directly contracted as Amp's O&M provider for the BESS system and will be providing a comprehensive operation and maintenance program for the batteries. This program includes 24/7 monitoring to ensure optimum performance and system safety. Powin will be providing monthly

reports summarizing battery usage, facility health, and maintenance events. A minimum of quarterly facility inspections will be made.

The Amp team will maintain the maintenance records. However, Amp does not plan to release its maintenance records for public review.

**Are spares readily available, if the individual cells fail?**

As part of the comprehensive operation and maintenance program, Powin is responsible for providing spare parts for the battery system, as necessary. The system uses a modular design, so it is relatively easy to integrate replacement components. The system has an extensive digital monitoring system, and the battery is designed so that any equipment displaying abnormal characteristics can be diagnosed and replaced, if necessary.

**How is the electricity transmitted from the solar array to the battery storage system?**

The solar array is connected to the direct current (DC) side of the Photovoltaic (PV) inverter. The battery is also connected to the DC side of the PV inverter through a series of DC-DC converters. The alternating current (AC) side of PV inverter is connected to the grid through the transformer. As a DC-coupled system, the solar array and battery both can send electricity to the utility grid through the PV inverter and main transformer. The solar energy can be sent either directly to the grid or the battery system before being sent to the grid. The battery system is charged only from solar power during the daytime. The battery system is discharged during afternoon and evening hours during periods of high customer demand.

**Concern regarding the 2019 McMicken Energy Storage Facility Fire/Arizona APS Battery Fire (the same event)**

As discussed during the Public Hearing, an explosion occurred near Phoenix, Arizona, in 2019, injuring four first responders. The injuries were the result of an explosion at a battery energy storage system that was installed in 2017. Burning battery cells released explosive gases, which built up inside the battery container. When the hazmat team opened the door to the battery in response to the fire, an explosion was triggered, injuring four first responders. (Source: https://www.greentechmedia.com/articles/read/arizona-battery-fire-already-prompted-safety-improvements-in-grid-storage)

This tragedy triggered a series of investigations and a renowned industry focus on battery safety standards and practices. As a result, battery energy storage industry safety has advanced significantly since the Arizona explosion, making a similar event incredibly unlikely with today's technology. The explosion occurred because of a build up of explosive gases in a battery system that did not have the ability to detect and vent dangerous gases.

The proposed Powin Energy battery energy storage system contains two highly sensitive hydrogen detectors. Two separate hydrogen sensors are placed at strategic locations throughout the enclosure and can detect hydrogen at levels significantly below the lower explosive limit. If hydrogen is detected, the off-gas alarm is triggered, and the HVACs enter emergency ventilation mode.

A gas sample port is built into the enclosure as an additional safety precaution. In an emergency situation, the concentration of explosive gases must be tested through the gas sample port before opening an enclosure door.

**Safety of 2019 Energy Storage System vs 2021 Energy Storage system**

During the Public Hearing, several questions were raised comparing the safety of the proposed 2021 system to the 2019 system. The 2021 battery energy storage system is a smaller (9.0 MWh, previously 11.78 MWh) and safer system than the battery energy storage solution that was approved in 2019. The system contains many safety features such as a built-in fire detection, suppression, and alarm system, redundant thermal controls, digital monitoring, and explosive gas detection and ventilation systems that were not included in the 2019 system.

A comment was made comparing a central system to storing all your gunpowder in one place. As mentioned during the Public Hearing, the Powin Energy system is UL 9540A certified. This certification pertains to the evaluation of "Thermal Runaway Fire Propagation in Battery Energy Storage Systems." Essentially, this third-party certification verifies that fire will not propagate in a thermal runaway event.

In addition, internal steel barriers around each stack separate system components as an additional thermal barrier to protect against fire propagation. The proposed battery energy storage design will include four steel battery enclosures spread out throughout the interior of the solar project. Due to physical separation between the steel enclosures and intentional setbacks and buffers from native fuels, the risk of fire propagation from one enclosure to another or the surrounding area is very low. Previously, a larger number of small batteries with more points of failure and fewer safety features were proposed throughout the site in straight lines along the AC trenches.

**Battery Discharge Schedule and Duration**

A precise battery discharge schedule cannot be provided because batteries are discharged at various times depending on electric power system needs and weather-dependent power generation levels. The batteries will generally be discharged between the hours of 1PM and 7PM.

A typical discharge time for the energy storage system is 2.5 hours. The discharge process will generate minimal noise which should be negligible to abutters.

### *Site Design Questions*

**Fence Height**

The proposed fence height is eight feet. Please refer to the Issued for Construction Plans, sheets C2.00 – Overall Site Plan and C5.01- Site Details for fence design details. The proposed fence meets NEC standards.

**Module Height**

The module tilt and height will change throughout the day as the single-axis tracker design follows the sun to maximize clean energy production. The modules will be at a 2.754 meter height when angled horizontal to the ground. The height will increase to 4.431 meters or approximately 14.5 feet at the upper edge when positioned at maximum tilt. This height complies with the 2016 Local Law's requirement that "ground mounted arrays shall not exceed 20 feet in height when oriented at maximum tilt." (Section 3g)

**Road Width**

The road widths were approved by the Duanesburg Fire Code Official on August 18, 2021 under the Section 503.1.1 Exception 2.

**Internet**

Not having readily available internet connectivity is common for solar and energy storage project locations. Projects typically install a satellite internet system which has suitable upload and download speeds to monitor and control the solar plus storage facility. Amp has already evaluated the Oak Hill project location and has confirmed that Viasat has adequate coverage at the project location.

**Disconnects**

The facility has been designed to meet or exceed the relevant electrical codes, utility requirements, and NEC standards for solar plus storage projects, utilizing industry best practices. Amp is confident suitable disconnects are available to isolate the various aspects of the facility in the event of abnormal conditions.

### *Noise Questions*

**Project Volume**

The battery enclosure HVAC units will be the loudest project component. At full power, the HVAC units will generate 84 decibels, as measured 5 feet from the enclosure. Please see the attached noise attenuation study prepared by a third party firm, EDP.

### *Environmental Questions*

**Vegetative Management**

The system has been designed such that sheep could be utilized for vegetative management. Many single-axis tracker solar projects use sheep for managing vegetation. This also fulfills Amp's goal of making these projects biodiversity and pollinator friendly sites.

**Site Disturbance**

The reported area of site disturbance has increased due to a change in calculation methodology, not project impact. A revised site disturbance methodology has been utilized by the Civil Engineer of Record.

As mentioned during the Public Hearing, the project's disturbance and footprint will decrease due to the utilization of higher efficiency modules. While the entire limit of disturbance was not included in the calculation methodology previously used in the approved 2019 project application, the position of project equipment and the project footprint was clearly displayed on the 2019 Proposed Site Plan for Oak Hill Solar.

**Modules and Anti-Glare Coating**

The proposed Vikram solar panels will include both anti-reflective ("AR") coated glass and a texturing pattern that combine to provide the highest level of glare resistance (typically utilized if in a sensitive location such as adjacent to an airport).

As described in the previously submitted *CSG Anti-glare ARC Solar Glass and application in module*, much of the module's anti-glare characteristics are generated by anti-glare glass. This specialized glass utilizes a rough surface so that the reflected light is diffused with a reduced level of glare. The AR coating is free of any toxic components. The coating is designed to withstand typical external environmental pressures and have a similar lifespan to the module's glass.

The Vikram modules have the appropriate safety approvals and certifications, including UL 1703.

**Project Drainage**

The project drainage was previously examined as an element of the 2019 project approval.

The Oak Hill projects' impervious surface has increased due to the inclusion of engineered foundations for the centralized battery storage enclosures and central inverters. However, infiltration trenches will surround all proposed equipment and pads to manage the stormwater. The expanded access roads

will be constructed with a pervious gravel access road material. Therefore, the expansion to the access road will not create additional impervious road surfaces.

**SWPPP Review by a Third-Party Engineer**
The SWPPP has been reviewed by a third-party engineer, Prime AE.

**Increased Access Road Dimensions Impact on Stormwater**
While the access roads have been significantly expanded to improve site navigation, the project will utilize a pervious gravel access road that will not create additional impervious road surfaces.

***Neighborhood Questions***

**Neighborhood Character**
The September 19, 2019 Town of Duanesburg Planning Board Resolution Approving Special Use Permit, Subdivision and Site Plan for the Eden Renewables Oak Hill Solar Energy Projects – 1206 Oak Hill Road states that "The Project will also not change the community character as it has been sited to not be visible to the maximum extent possible to surrounding homes and roadways, and an evergreen landscaped buffer will be created on the property containing the project as set forth above" (Section 2J)

**Property Values**
Amp is unaware of any credible studies demonstrating that solar or energy storage projects reduce property values.

***Historic Questions***

**Eden's Historic Market Rendering:**
Many Public Hearing comments focused on a historic Eden marketing rendering. For questions regarding Amp's proposed design, please refer to the Oak Hill Solar 1 & 2 Issued for Construction Plans ("IFC").

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**2020 Fire on the Murray Property**
The project team is thankful to the first responders who responded to the March 11, 2020 fire at Murray family property, it sounded like a truly scary event. However, we have not yet mobilized for construction as of August 2021. This fire had nothing to do with our projects. For questions regarding the 2020 fire, please refer to the Schenectady County, NY Office of Fire Coordinator Fire Investigation Division Fire Examination and Report (Report $ 20-48007-03-04).

**NYSERDA Documents**
Model NYSERDA regulations were referenced several times during the Public Hearing. According to the NYSERDA website, the "Model Solar Energy Local Law

serves as a resource to inform local officials on the processes of installing, operating, maintaining and decommissioning solar systems in their respective jurisdictions…officials can then use this Model Law to assist them in examining their own local laws, regulations, and policies to adopt their own rules and regulations that make sense for their respective community with regards to solar development."

The Model Local Law States in its overview section that "It is not recommended for municipalities to use the Model Law 'as is.'" The resource was created to help local governments and officials "adopt their own rules and regulations that make sense for their respective community with regards to solar development." As a point of clarification, NYSERDA guidebooks provide suggestions.

Thank you for your time and consideration.

**Oak Hill Solar 1 LLC and Oak Hill Solar 2 LLC**
**By: AMP Solar Development Inc., its Manager**

Nicole LeBlanc

Nicole LeBlanc
Authorized Signatory
Director, US Transactions