Revised Generation Interconnection Feasibility/System Impact Study Report

For

PJM Generation Interconnection Request Queue Position V4-001

Lebanon 34.5kV

May 2010

Preface

The intent of the Combined Feasibility/System Impact Study is to determine a plan, with approximate cost and construction times estimates, to connect the subject generation interconnection project to the PJM network at a location specified b the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of construction Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specification (on the PJM web site) for the appropriate transmission owner.

In some instances an Interconnection Customer may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, may also contribute to the need for the same network reinforcement. The possibility of sharing the reinforcement costs with other projects may be identified in the Feasibility study, but the action allocation, if an , is included in the System Impact Study.

The study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, ad construction permit issues. For properties currently owned by Transmission Owners, the costs associated with them will be addressed when seeking an Interconnection Agreement as outlines below. Developer will also be responsible for providing and installing metering equipment in compliance with applicable PJM and Transmission Owner standards.

General

Garden Solar, LLC, the Interconnection Customer (IC), has proposed a 2.0 MW (0.0 MW capacity) solar generating facility. The facility will be located at 103 Buffalo Hollow Road in Lebanon Township, New Jersey

Point of Interconnection

V4-001 will interconnect with the 12.47kV Jersey Central Power and Light distribution circuit #27593, from the Glen Gardener substation.

Network Impacts

The queue V4-001 project was studied as a 2MW energy-only injection into JCPL's system at the Glen Gardner 34.5kV substation. The project was studied on a combined feasibility-impact basis which utilizes an AC analysis, and incorporates all contingency types. Project V4-001 was evaluated for compliance with reliability criteria for summer peak conditions in 2014.

Potential network impacts were as follows:

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

No problems identified.

Multiple Facility Contingency

(Double Circuit Tower Line, Line with Failed Breaker and, Bus Fault contingencies for the Full energy output.

No problems identified.

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

No problems identified.

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. "Network Impacts," initially caused by the addition of this project's generation)

None.

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project.

None.

Potential Congestion due to Local Energy Deliverability

(PJM also studied the delivery of the energy portion of the surrounding generation. . Any potential problems identified below are likely to result in operational restrictions to the project under study. . The developer can proceed with Network Upgrades to eliminate the operational restriction at their discretion by submitting a Transmission Interconnection Request. . Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full deliverability for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which analyzes all overload conditions associated with the identified overloaded element(s). . As a result of the aggregate energy resources in the area, the following violations were identified:

No problems identified.

Short Circuit Study

Available 3 phase fault current on the 12.5kV distribution system at the proposed interconnection location without proposed generation is 4,491 Amps – 3 phase amps and 3813 Amps Line to ground amps. Addition of the generator contributes an additional 3% to the available three phase short circuit current on the 12.5kV circuit at the proposed generator site.

Equipment Loading

The output of the proposed 2.0MW solar panel generation facility represents 31% of the recent summer peak and 44% of the minimum daytime load on the distribution circuit. SCADA Control System with load monitoring and control will be required. Distributed generation must not interfere or degrade the quality of service to any other FirstEnergy Corp. customers (service voltage, voltage flicker, harmonics, service reliability etc).

Voltage Study

Analysis study shows no adverse impact on the JCPL System Voltage Profile as a result of the connection of this facility.

Circuit protection and co ordination

Main Line

To accommodate the proposed 2.0 MW capacity, the JCP&L protective fuses on the tap to the facility will be 100K- allowing a nominal current of 100 amps of primary current- 2.16 MW of power export. There are no other protective devices installed between the IC and the substation.

At Substation

Replace existing electro-mechanical relays with SEL-351 electronic relays on 2 distribution circuits and Transformer Bank at Glen Gardner Substation. Provide wiring, conduit and check out configuration to tie into our substation entry point.

At PV Facility

SCADA control system for the breaker will be designed by the customer, and must be approved by JCP&L/FirstEnergy prior to purchase. Typically, these systems utilize fiber optic, leased phone line, or radio communications. The SCADA control system must communicate with our RDO dispatch center located in Morristown, NJ.

The customer must install and maintain the SCADA control system equipment. Equipment needed inside JCP&L facilities may be installed by JCP&L personnel. Periodic testing of the system will be required and the system must be configured to fail in a ‘trip’ condition- i.e. upon loss of communications, the system must trip the generator off line.

Distributed Generation must not interfere with the proper detection and clearing of faults on the First Energy system.

Metering and Communications

JCP&L shall provide, own, operate, and maintain the revenue metering equipment at the Customer's expense unless otherwise agreed to by the Parties. The revenue metering equipment includes, but is not limited to, instrument transformers (CT's and VT's), CT/VT secondary wires, meter socket, bidirectional revenue meter, and associated devices.

JCP&L shall account for station power at the Customer facility as required by the applicable Company Rate Schedule and/or the governmental agency having jurisdiction for providing electric energy for the time periods when the electrical energy output for the Customer facility is negative.

The revenue metering equipment shall be located at the generation facility on the high voltage side of the main step-up transformer(s) unless otherwise agreed to by the Parties. The revenue metering will be compensated for electrical energy losses if it is not located at the Point of Interconnection.

The Customer shall provide and install the mounting structures (or enclosures) and conduits necessary for the metering installation unless otherwise agreed to by JCP&L. The conduit shall be 1-1/2 inch galvanized rigid steel conduit. Flexible galvanized steel (liquid tight) conduit may be used between instrument transformers. JCP&L will install the CT/VT secondary wiring in the conduit between the instrument transformers and the meter socket.

The Customer shall mount the instrument transformers and meter socket in a location that is readily accessible to authorized JCP&L representatives. If for any reason the meter socket and/or associated devices must be mounted in a weatherproof enclosure, it shall be provided and installed by the Customer. The meter socket shall be installed generally within 50 feet of the instrument transformers unless an alternate design has been approved by JCP&L. The meter socket shall be mounted such that the centerline of the meter is approximately five feet above final grade. Where vehicle traffic may interfere with or damage any revenue metering equipment, the Customer must install concrete filled steel barrier posts to protect such equipment.

The bidirectional revenue meter provided and installed by JCP&L will record billing data in thirty minute intervals. The Customer shall provide, at its sole cost and expense, the installation, operation, and maintenance of the communication link(s) required by JCP&L billing data collection system for access to the meter. The specifications for the typical telephone communication link are as follows:

- Standard voice grade (analog) with dial tone. No digital telephone lines are permitted.
- Two-pair or four-conductor with RJ-11 / Male termination. JCP&L will make final connection to the meter.

- Must be able to receive incoming calls.
- Must be a direct line to the meter with no operator interception or operation required.
- Install the telephone line and associated conduit between the telephone company source and the meter socket or enclosure.
- The telephone line must be tagged with a phone number, including the area code.
- The telephone line must be installed and operational prior to the Customer's service being energized.

The Customer shall install, at its expense, separate metering and telemetry equipment to provide the real-time MW, MVAR, volts, and amps data required by JCP&L Data Center.

JCP&L will provide the Customer access to bidirectional kWh and kVARh pulses from the revenue meter if requested.

Garden Solar, LLC will be responsible for designing, furnishing and installing a SCADA RTU in their generation substation and obtaining the telecommunication circuits from the RTU to JCP&L Data Center.

Additional requirements

- JCP&L will work with the customer to determine the exact interconnection point, based on existing infrastructure layout.
- Interconnect Customer (IC) will install a pole adjacent to JCP&L's pole as point of interconnection. On this pole the IC will install cutout fuses with load break capability, primary metering transformer bracket per the FE Construction Standards of page# 10-347. IC will also install the revenue metering CTs and PTs, to be supplied by JCP&L.
- IC provides all trenching, cables and conduit from JCP&L's point of interconnection pole to connect his PV generation facilities.
- IC must meet all applicable JCP&L/FirstEnergy standards and requirements which are included in the current Tariff for Service.
- IC's inverter-based generation must be UL listed or certified to comply with the requirements of IEEE 1547.
- IC's main breaker shall have a SEL 351 Multi-function relay (or equivalent) which is required for interconnection protection. All breakers, lightning protection etc. should meet JCP&L/FE's minimum BIL Ratings.
- The IC's transformer must be grounded Wye to grounded Wye.

- IC must meet requirements of N.J.A.C. 14:4-9 ("In front of meter" all power sold to PJM and interconnection standards for Class I Renewable Energy Systems), as well as IEEE 1547, and IEEE 1547.1

- IC must meet applicable FE Distributed Generation Technical requirements for the interconnection of generation to the FE Distribution system.

Infrastructure Upgrade Costs (By JCP&L)

- Conceptual cost to build 600 ft of three phase (336 ACSR) distribution construction and extend two spans of new three phase 336 ACSR conductor about 400 feet, three 100K fuses, manually operable disconnect switch and Primary metering at the interconnection point is $ 120,000.

- Substation upgrade cost is $ 160,000.

- Note: The above costs do not include taxes. If appropriate, this could add approximately an additional 34% to the Project cost.

- All JCPL costs are not subject to refundable provisions of the NJ-BPU Tariff for Electric service

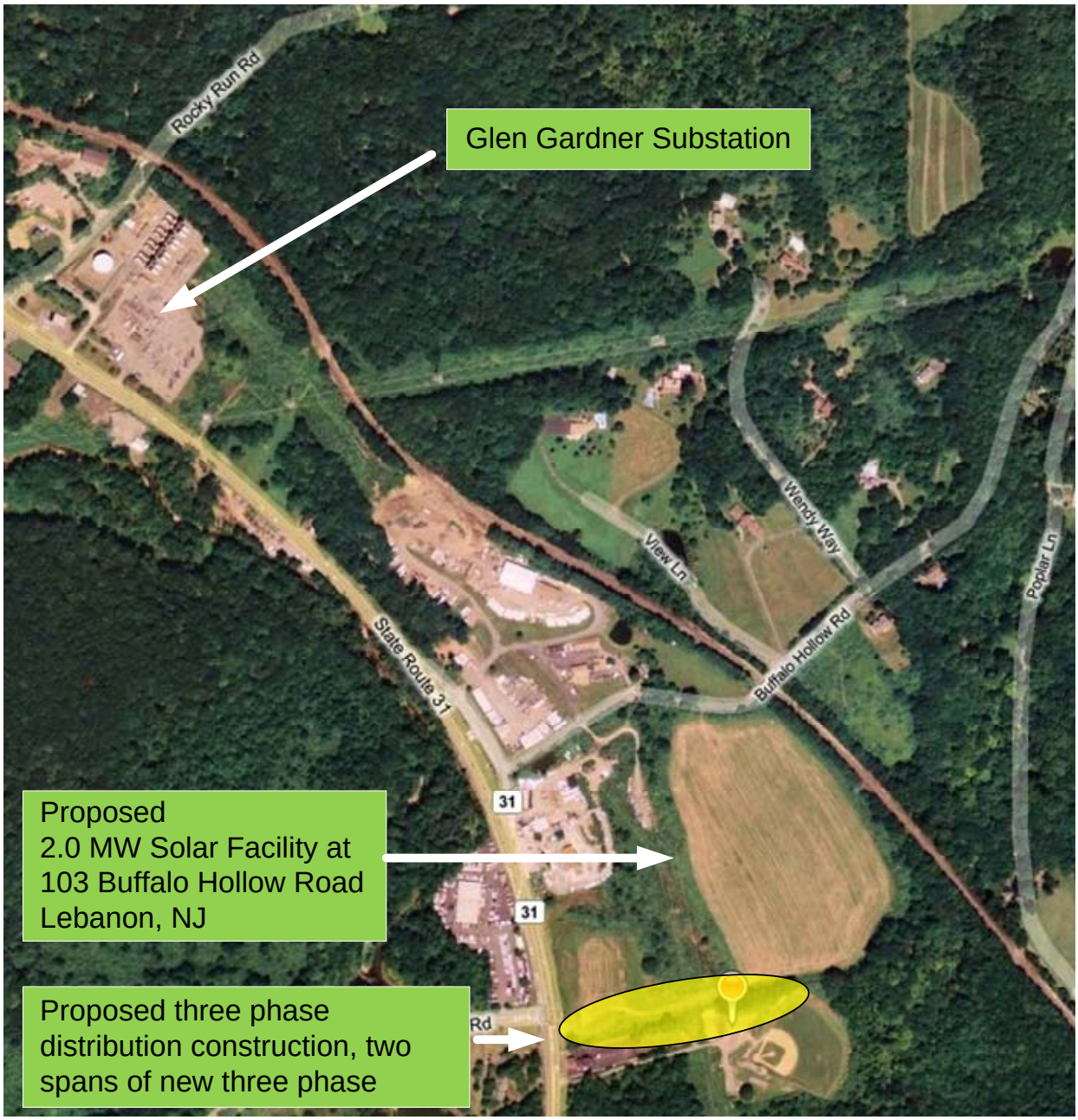
Note - this is an estimate based on similar work orders previously worked by JCP&L for the types of work described in the analysis above. Should the customer want to proceed with the connection of this facility a contract with JCPL will be developed based on these costs and a true-up of actual charges will be made at the completion of the project

Timetable for Construction

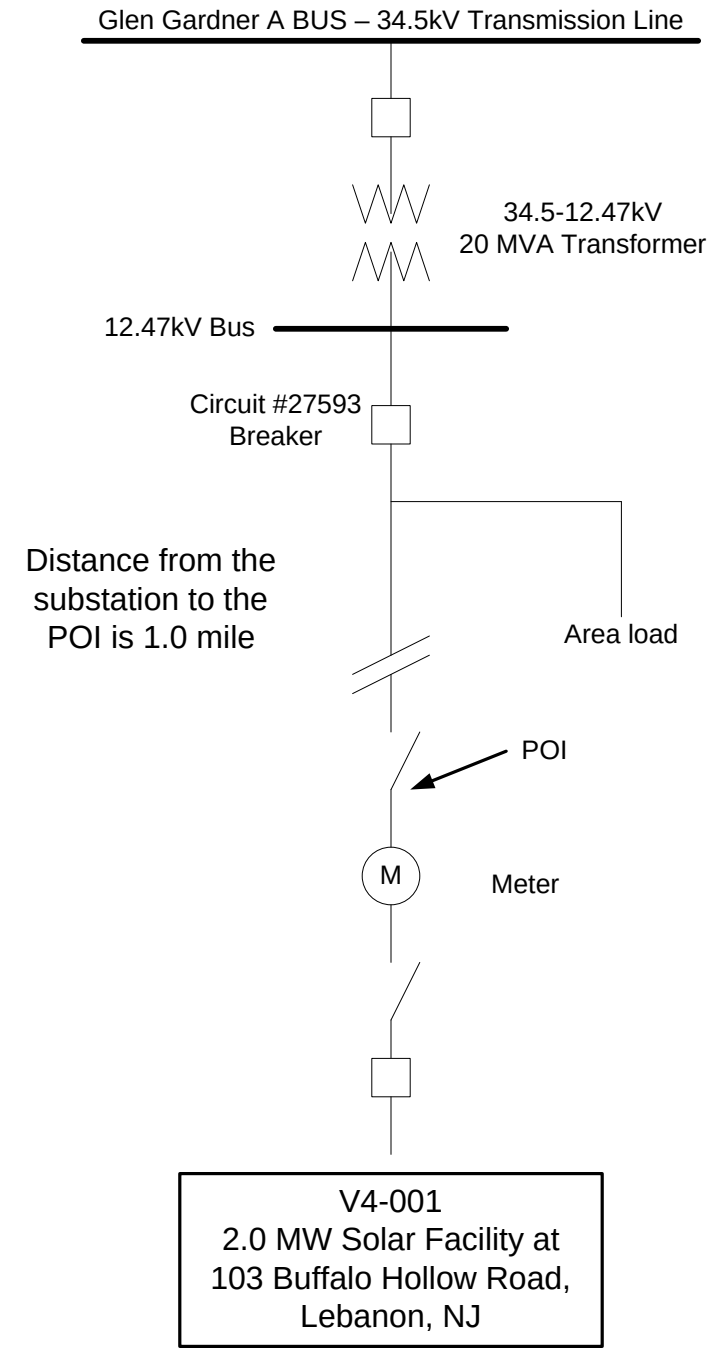
JCP&L estimates 3 months after receipt of funds for design work to be completed.

The final design of the tap line to connect to the proposed site may require additional information that is dependent on the customer to furnish.

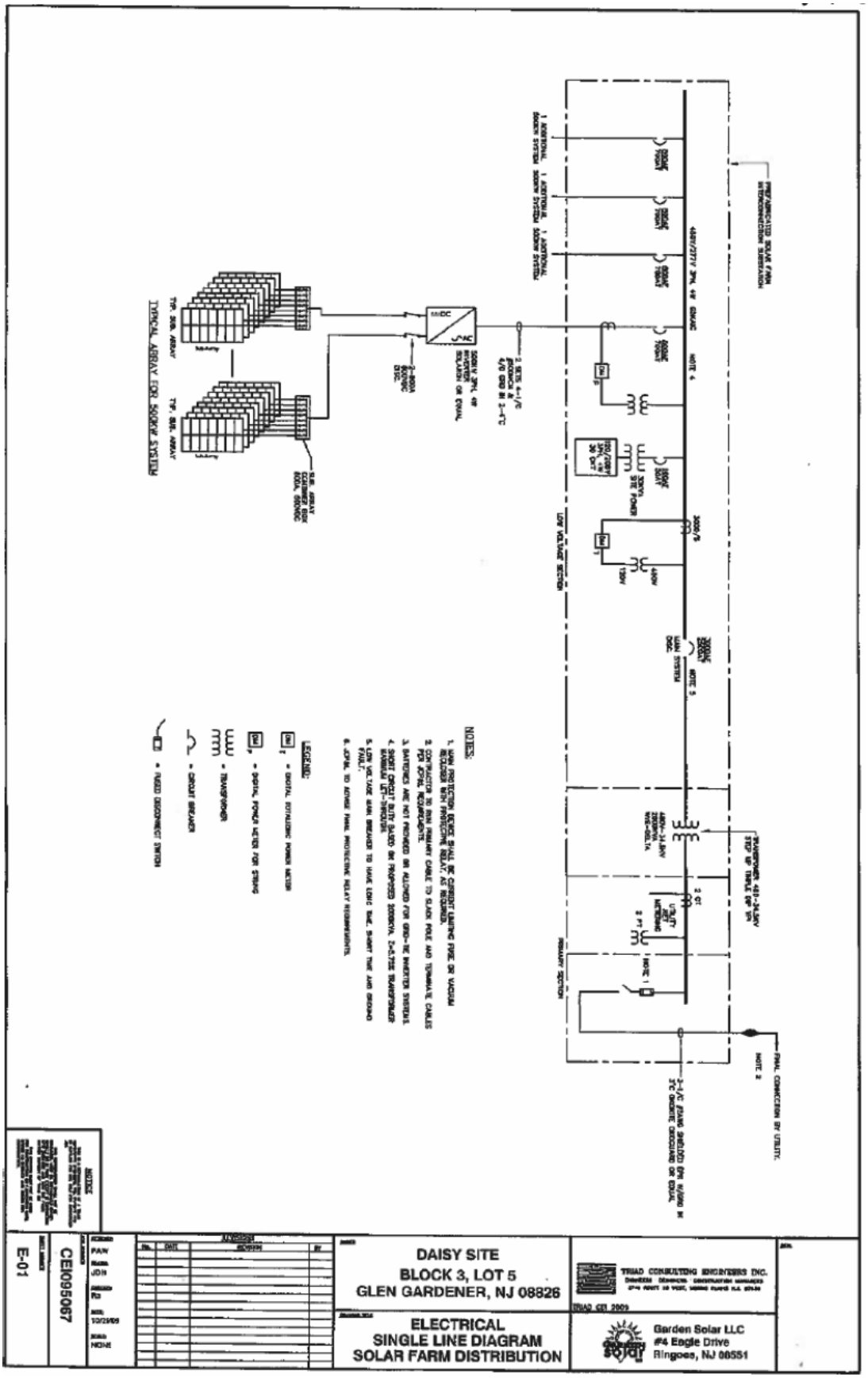
JCP&L estimates it will require an additional 5 months to complete the identified infrastructure upgrades.



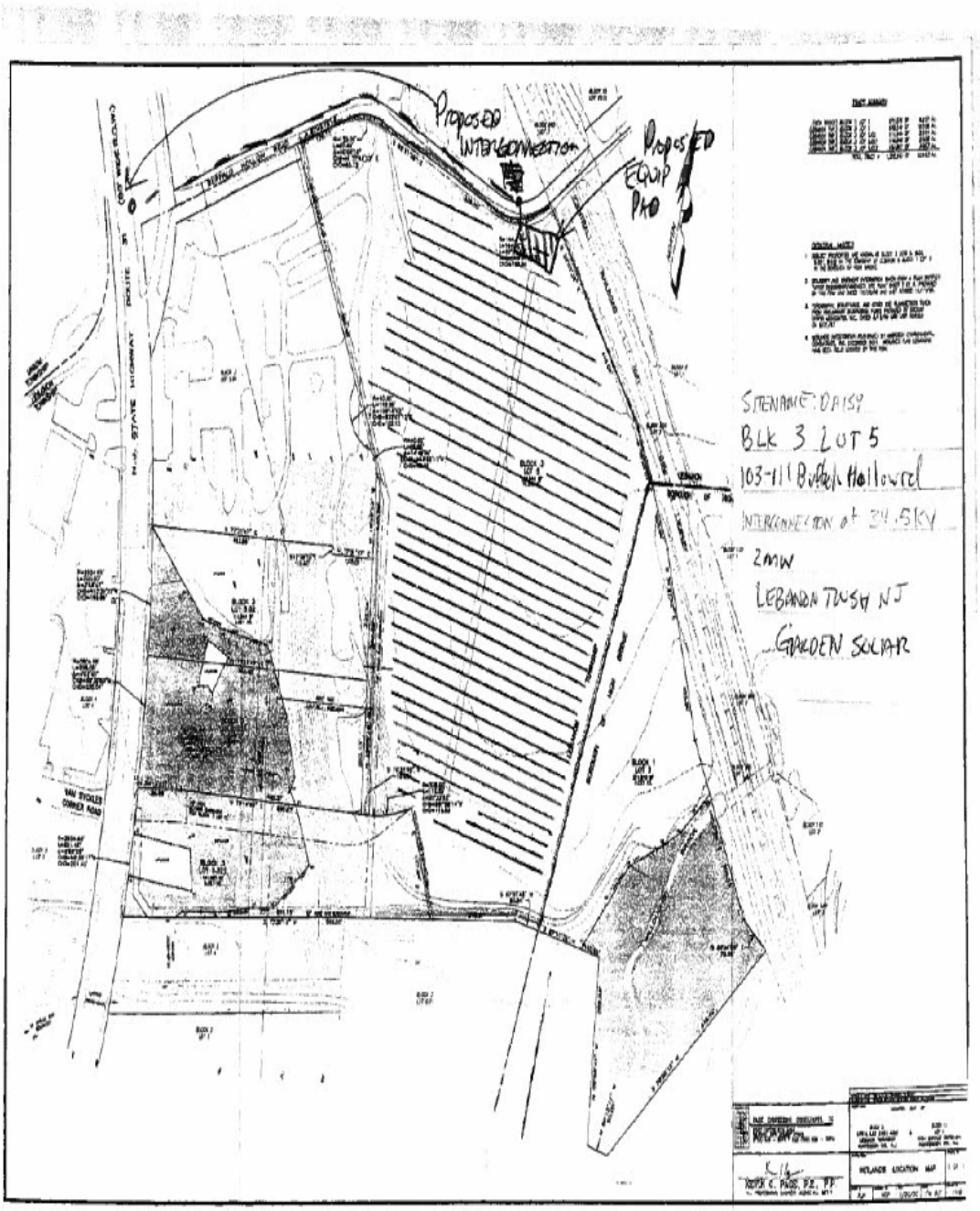
Glen Gardner Substation



V4-001
2.0 MW Solar Facility at
103 Buffalo Hollow Road,
Lebanon, NJ



V4-001



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