Final Technical Review (CESIR)

[redacted]

5932 Monks Road
Canadaigua, NY 14424

File # 11446

Prepared By: (LaBella)
Reviewed By: MAC
Date: May 8, 2017

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Introduction

This Final Technical Review describes the interconnection and lists the responsibilities of Cypress Creek Renewables, Chris Norqual, and RGE, and provides a cost estimate.

I. Project Description

Cypress Creek Renewables is applying to interconnect a [redacted] photovoltaic generating station to be located at 5932 Monks Road in Canadaigua. The contact for the project is - of Cypress Creek Renewables, [redacted]

[redacted]

II. Planning

Distribution Planning performed studies to determine if the Project can be interconnected to existing [redacted] distribution feeder [redacted] to comply with the requirements contained in IEEE 1547, *Standard for Interconnecting Distributed Resources with Electric Power Systems*.

Distribution Planning Requirements and Conclusions:

A. Each individual PCC location must have the ability to trip offline within 2.0 seconds for the loss of voltage on any one individual phase in order to electrically isolate the IPP from the utility at the generator interconnection and must be verified at checkout.

B. Any circuit tap, substation, or distribution line regulators, and substation LTC/regulator controls must be either already equipped with or changed out to retrofitted microprocessor controls that will handle reverse power flow and co-generation functionality. Based preliminary studies, the substation regulators should be set to 'co-generation' mode if it is a Siemen MJXL or MJ4A control. If it is an older M-2001C Beckwith control, it should be upgraded to an M-2001D unit and the 'DG' or 'auto determination' mode set. These include:
   - Upgrade substation 143 bank LTC controls required

C. Transmission Planning will need to review the proposed installation:

a. Transmission Planning does not have any concerns with the installation of this proposed generation at this location on the transmission system.

D. If the IPP cannot comply with the voltage regulation threshold criteria, install new line regulators on the utility-side of the PCC location. The new line circuit regulators shall be equipped with reverse power flow & co-generation functionality (Beckwith M2001-D).

E. Install a new microprocessor-controlled line recloser equipped with directionality on the utility-side of the Primary Metered Service at the PCC.

120 A Phase Pickup: 1-DT
25 A Ground Pickup: 1-DT
One-shot to lockout
No reset time
Directionality must be enabled to trip in the forward direction only

F. Any potential manual or automatic switching schemes with other distribution circuits will require the customer to disconnect from the distribution circuit at the customer's PCC.

G. Protection & coordination is based on only the system-normal circuit configuration, and is not applicable for switching scenarios and ties with other distribution circuits.

H. The existing transmission circuit relaying will need to reviewed and verified by System Engineering in order to properly coordinate with the proposed downstream distribution protective devices.

I. For Primary Metered Service, inrush compensation may need to be enabled by the division.

J. Primary Distribution Interconnection/Transformer Connection:

Primary Distribution Line Configuration	***Interconnection to Primary Distribution Line***
Three-phase, three-wire	*If a three-phase or single-phase generator, interconnection must be phase-to-phase*
Three-phase, four-wire	*If a three-phase (effectively grounded) or single-phase generator, interconnection must be line-to-neutral*

III. Interconnection Protection

A. Information from the Customer

The Customer provided a three line diagram for the Project which does not include protection settings. The drawings are NOT stamped by a licensed New York State Professional Engineer.

B. Equipment Verification

1. Type Tested and Approved Equipment

[redacted]

2. Three Phase Automatic Interrupting Device

[redacted]

3. AC Disconnect Switch

[redacted]

4. CTs and VTs

[redacted]

5. Transformer

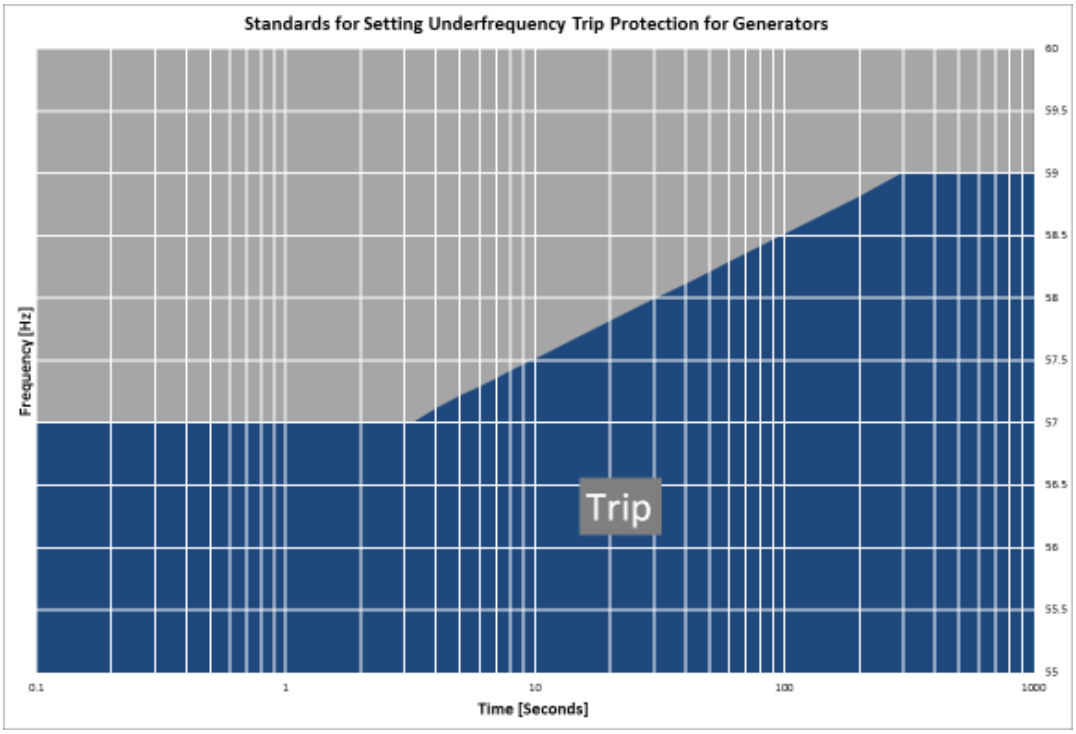
[redacted]

C. Protection Studies

1. Voltage-Frequency

The proposed voltage and frequency settings for the inverters are NOT provided. The settings need to be as follows:

Voltage (% of Rated)	Clearing Time (s)
V < 50	0.16
50 ≤ V < 88	2.00
110 ≤ V < 120	1.00
V ≥ 120	0.16



The Customer will need to provide these to RGE for review and approval.

2. Automatic Reclosing of the New Generation

The Customer is hereby reminded that any closing of the inverter to the utility system must be delayed by at least 5 minutes following restoration of the utility system to a healthy voltage and frequency.

3. Grounding Studies

The Coefficient of Grounding (COG) for the installation has been calculated to be 0.55. The COG is less than 0.8, so the system is effectively grounded.

4. Short Circuit Studies

As a result of the installation, the short circuit current on the [redacted] bus increases as follows:

	Present System	System with New Generation Added
3□ short circuit current (A)	824	943
1□-g short circuit current (A)	1095	1232

No interrupting devices on the RGE electrical system are over duty as a result of the additional source of short circuit current.

5. Protection Coverage

The new generation does not affect protection coverage of the protective relays on the feeder terminal at RGE substation 143.

6. Switching to Other Sources

The new generation must be disconnected from the electrical system if it is switched to the adjacent feeders during maintenance or system emergencies. The electrical parameters of the adjacent feeders (impedance, grounding, system protection) would be different than those of the interconnecting feeder, and the impact of the generation on the adjacent feeders are not known. For these operating scenarios, the generation would be required to be disconnected from the electrical system until the electrical system is returned to normal configuration.

7. Ferroresonance

   Ferroresonant over-voltages have not been found to be a problem for inverters of the same technology interconnected to the same distribution feeder.

8. Anti - Islanding

   Inverter must be in compliance with UL1741 and the complete system must comply with the National Electric Safety Code, the National Electric Code and the IEEE 1547 standard. Each individual PCC location must have the ability to trip offline within 2.0 seconds for the loss of voltage on any one individual phase in order to electrically isolate the IPP from the utility at the generator interconnection and must be verified at checkout. Anti-islanding to be certified by PE and witness tested by the utility.

   No significant risk of unintentional islanding exists, no further study or investigation required. Provided that the customer uses the same manufacturer of inverters as stated in their application, if the manufacturer is changed it must be reviewed to ensure that the new manufacturer complies with the anti-islanding standards.

9. Metering

   RGE will install a primary revenue meter and associated instrument transformers for the customer's primary service. For primary meter installations, developer is to procure and install meter pole. The estimated cost for the RGE equipment and installation will be included in the estimate section of the report.

IV. Schedule

Distribution system upgrades, engineering, procurement and construction may take 10 to 12 months after receipt of funding.

V. Cost

Cost Estimate File #11446

Scope:

A. Install recloser w/SCADA at PCC

B. Substation bank LTC control upgrade

C. Install 3-phase Primary Metering Service

D. Engineering support

Estimate Detail	cost/unit	unit	total
Install a recloser with SCADA at PCC			
Materials	[redacted]	[redacted]	[redacted]
Labor	[redacted]	[redacted]	[redacted]
Overheads	[redacted]	[redacted]	[redacted]
Distribution 3 phase pole with buck arms and cutouts			
Materials	[redacted]	[redacted]	[redacted]
Labor	[redacted]	[redacted]	[redacted]
Overheads	[redacted]	[redacted]	[redacted]
Build 3-phase +/-500’ distribution including 4 poles & 2 Anchor’s	[redacted]	[redacted]	[redacted]
Substation bank LTC control upgrade			
Materials	[redacted]	[redacted]	[redacted]
Labor	[redacted]	[redacted]	[redacted]
Overheads	[redacted]	[redacted]	[redacted]
Install 3-phase Primary Metering Service	[redacted]	[redacted]	[redacted]
Engineering support	[redacted]	[redacted]	[redacted]
Sub total			[redacted]
Taxes			[redacted]
Total			[redacted]

[redacted]

VI. RGE Responsibility

RGE will:

A. Engineer, design, procure and construct the distribution system upgrades as described in section V cost estimate work scope;

B. Install new Recloser with SCADA-ready communications and control capability, and directionality at the point of common coupling;

C. Install primary revenue metering for primary service on developer provided facilities;

D. Review the Customer drawings and equipment specifications relevant to the generation and interconnection;

E. Conduct a site visit for final checkout of the installed equipment and verification of the AC system operation;

F. Retains the right to witness the commissioning tests;

VII. Customer Responsibility

The Customer will:

A. Provide equipment specifications for the inverters and AC disconnect switch;

B. Install primary electric service and metering facilities per RG&E specification 'Requirements for Electric Services and Metering.' Install a phone circuit (POTs) line to RG&E revenue meter for MV-90 dial up system.

C. Provide voltage and frequency settings for the PV inverters to RGE for review and approval;

D. Design and install the generating facility as reviewed and accepted by RGE;

E. Complete the Checkout Form for Generation Protected by Type Tested and Approved Equipment and return it to RGE;

F. Provide a copy of the electrical inspection certificate and a completion letter certifying that the system has been installed and tested in compliance with the NYS PSC SIR, the utility-accepted design, and the equipment manufacturer’s instructions;

G. Coordinate final field checkout with RGE;

H. Provide a 24/7 contact for Operations;

Division	Canandaigua
Local Utility Substation	RGE Substation 143 Circuit 5146
Project Name	Project 20767 (Cypress Creek Renewables LLC) - 11446
Address	5932 Monks Road Canandaigua, NY 14424

		Satisfactorily Performed As Required? (√)	**Comments**
1.	**Equipment Name Plate Data is accessible or on the major equipment list.**		
2.	**Spot check this list where nameplates are visible. If the nameplates are not visible and there is no PE stamp on the list, the equipment must be disassembled for inspection.**		
3.	**Relay calibration tests - Verify there is a relay test report and that settings in the relay match the check out list.**		
4.	**Verify output of the multifunction relay trips the main contactor.**		
5.	**Witness failure of the multifunction relay or loss of DC trips the main contactor**		
6.	**Verify the generator disconnect switch has a double lock and proper signage. Verify the generator disconnect switch has a visible break.**		
7.	**Open the generator disconnect switch with the generator running and make certain that the generator trips and doesn't reconnect for 5 minutes after power is restored.**		
8.	**Once the generation is on line, verify the meter readings in multifunction are reasonable and in the correct direction.**		

Verified By:		Review By:		Accepted By:	
Date:		**Date:**		**Date:**	

Please return a copy of this completed form to Richard Kauffman in Binghamton.

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INSPECTION FORM

Verify that the following data is consistent with equipment installed by the Developer by a checkmark, otherwise supply correct data.

NOTE: N/A means not applicable.

Verification of Developer's Equipment Nameplate Data and Location

1. Generator(s)/Prime Mover(s)

Number of Units	**1**

Generator Data	Unit #1	√	Unit #2	√	Unit #3	√	Comments
Type of Generator	[redacted]						
Manufacturer	[redacted]						
Firmware Version No.							
Rated Output (kVA)	[redacted]						
Rated Output (kW)	[redacted]						
Rated Voltage	[redacted]						
Rated Current	[redacted]						
Rated Frequency (Hz)	[redacted]						
Rated Speed (RPM)	[redacted]						
Power Factor (%)	[redacted]						
Phase (1 or 3)	[redacted]						
Connection	[redacted]						
Type of Grounding							
Grounding Ohms							

Prime Mover

	Unit #1	√	Unit #2	√	Unit #3	√	Comments
Type of Prime Mover	PV						
Rated Output (HP)	N/A						
Rated Speed (RPM)	N/A						

PV Array (If Applicable)

	Unit #1	√	Unit #2	√	Unit #3	√	Comments
Type of Panels	[redacted]						
Rated Output (kVA)	[redacted]						
No. of Panels	[redacted]						

2. Transformer(s)

	Interface (GSU)	√	Comments
Owner			
Manufacturer	[redacted]		
Rated (kVA)	[redacted]		
Rated Primary Voltage	[redacted]		
Rated Secondary Voltage	[redacted]		
Connection – Primary	[redacted]		
Connection – Secondary	[redacted]		
Phase	[redacted]		
% Impedance	[redacted]		
Primary Fuse			
No. of Transformers	[redacted]		
Type of Grounding			
Grounding Ohms			
Location – See One Line			

3. Capacitor Bank

		√	Comments
Rated kVAR			No Capacitor Bank Required / Installed
Phase			
Connection			

Location – See One Line			

4. Fault Interrupting Device(s)

	Main	√	**Unit #1**	√	**Unit #2**	√	**Unit #3**	√	**Comments**
Manufacturer									
Type	Load Break								
Rated Voltage	15kV								
Rated Current	200A								
Interrupting Current									
Operating Time									
Location – See One Line									

5. Generator AC Disconnect Switch

		√	**Comments**
Owner	Customer		
Manufacturer			Same as above
Type			
Rated Horsepower	N/A		
Rated Voltage			
Interrupting Current			
Location – See One Line			

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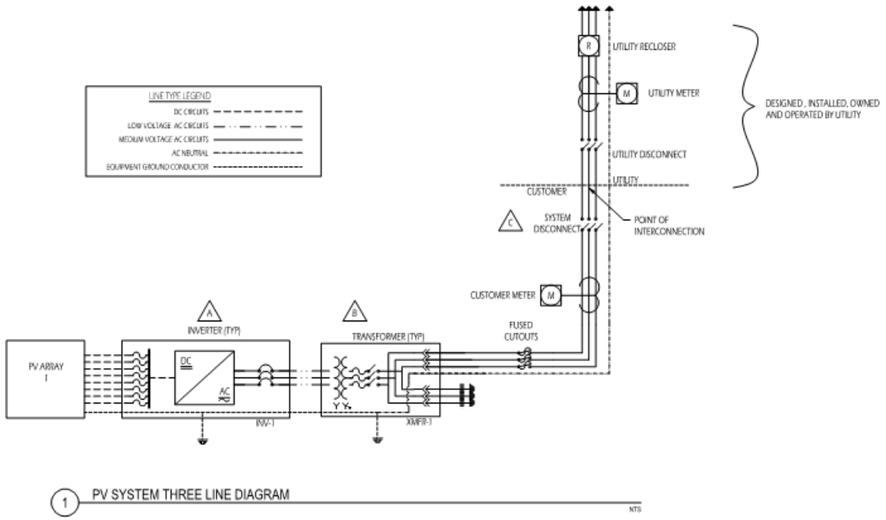
6. Fault and Isolation Protection – (For Reference Only – Do Not Check)

Isolation Protection

		√		√		√		√	Comments
Function	27		59		81U		81O		
Trip Interrupt. Dev.									
Manufacturer									
Type									
VT/CT Ratio									
Tap (Pick-up)									
Time Dial									
Set Point									
Location – See One Line									

7. Metering

Metering Option	
Meter Number	
Meter Read	



1 PV SYSTEM THREE LINE DIAGRAM

NTS

PROJECT INFO:

SYSTEM SIZE:

AC SYSTEM RATING: 2.0 MW AC
DC SYSTEM RATING: 3.0 MW DC

UTILITY:

NYSEG

APPLICANT:

CYPRESS CREEK RENEWABLES
3250 OCEAN PARK BLVD, STE 355
SANTA MONICA, CA 90405

GENERAL NOTES:

1. ALL EQUIPMENT SHALL BE UL LISTED FOR USE IN SYSTEM CONFIGURATION.
2. INSTALLATION SHALL COMPLY WITH NEC 2011 STANDARDS.
3. DC ARRAY SYSTEM SIZE AND CONFIGURATION MAY VARY UPON FINAL DESIGN.
4. MEDIUM VOLTAGE UTILITY INTERCONNECTION SHALL BE IN COMPLIANCE WITH UTILITY STANDARDS.

SYMBOLS:

- CIRCUIT BREAKER
- DISCONNECT
- FUSE
- FUSED DISCONNECT
- SURGE ARRESTER

EQUIPMENT DETAILS:

EQUIPMENT SCHEDULE

ID	DESCRIPTION	QTY	SPECIFICATIONS
A	INVERTER	1	[redacted]
B	TRANSFORMER	1	
C	SYSTEM DISCONNECT	1	

CYPRESS CREEK RENEWABLES

CYPRESS CREEK RENEWABLES
3250 OCEAN PARK BLVD
SUITE 355
SANTA MONICA, CA 90405

601 W MAIN ST
SUITE A
CARRBORO, NC 27510

FOR INTERCONNECTION APPROVAL ONLY - NOT FOR CONSTRUCTION

NO.	REVISIONS	BY	DATE

THREE LINE DIAGRAM

Project 20767
5932 Monks Road
Canandaigua, NY 14424

DRAWN BY:	JS
CHECKED BY:	PB
DATE:	01/20/16
SCALE:	NONE
SHEET	PV-1