



PV TOTAL SYSTEM SUMMARY
 7,025 PV MODULES TOTAL
 440W PV MODULES
 3,091 KW DC TOTAL
 2,660 KW AC TOTAL
 1 X 2660KW INVERTER
 25 MODULES PER STRING
 281 STRINGS TOTAL
 1 X 2660KVA TRANSFORMER

ENERGY STORAGE
 2,062.5MWH / 4.125MWH TOTAL RATING
 2.0 STORAGE HOURS
 4 X 500KW DC-DC CONVERTERS

TOTAL SYSTEM SUMMARY
 2,660 KW / 2,660KVA LIMITED

PROPOSED UL1741SA INVERTER INTERNAL CONTROL SETTINGS: (600V NOMINAL - 600V BASE)

DEVICE	PICKUP	TOTAL CLEARING TIME
27-2	88% (528V)	120 CYC (2.0 SEC)
27-1	50% (300V)	66 CYC (1.1 SEC)
59-1	110% (660V)	120 CYC (2.0 SEC)
59-2	120% (720V)	10 CYC (0.16 SEC)
81U-2	58.5HZ	18,000 CYC (300 SEC)
81U-1	56.5HZ	10 CYC (0.16 SEC)
81O-1	61.2HZ	18,000 CYC (300 SEC)
81O-2	62.0HZ	10 CYC (0.16 SEC)
59A	1.3PU	1MS

1. SETTINGS ARE BASED ON IEEE1547-2018 AND ISO NEW ENGLAND RIDE-THROUGH REQUIREMENTS.
 2. AFTER AN EPS DISTURBANCE NO RE-CONNECTION SHALL TAKE PLACE UNLESS VOLTAGE IS WITHIN 0.95-1.05 PER UNIT OF NOMINAL VOLTAGE (570-630V ON A 600V BASE) AND FREQUENCY IS WITHIN 59.5-60.5HZ.

PROPOSED 651R RELAY SETTINGS:

DEVICE	PICKUP	DELAY SETTING	TOTAL CLEAR
27-2	50% (24.9V)	63 CYC	66 CYC (1.1 SEC)
27-1	88% (43.8V)	117 CYC	120 CYC (2.0 SEC)
59-1	110% (54.9V)	117 CYC	120 CYC (2.0 SEC)
59-2	120% (59.8V)	6.5 CYC	9.5 CYC (0.16 SEC)
81U-2	56.5HZ	6.5 CYC	9.5 CYC (0.16 SEC)
81U-1	58.5HZ	17997 CYC	18000 CYC (300 SEC)
81O-1	61.2HZ	17997 CYC	18000 CYC (300 SEC)
81O-2	62.0HZ	6.5 CYC	9.5 CYC (0.16 SEC)
51	0.58X/115A	2.0TD U4	
51G	0.25X/50A	2.0TD U4	
32R	2660KW	117 CYC	120 CYC (2.0 SEC)

• SETTINGS INCLUDED 3 CYCLE CONTACTOR OPENING TIME.
 • VOLTAGE SETTINGS ARE BASED ON A 10000:1 LOW ENERGY ANALOG (LEA) VOLTAGE SENSOR, AND EFFECTIVE PT RATIO OF 266.67:1 (13.2KV / 10000 X 37.5 = 49.8V BASE). VOLTAGE SENSOR ACCURACY CLASS 1.2X.
 • RELAY LOGIC TO PROVIDE FOR "FAIL-SAFE" OPERATION TO TRIP ON LOSS OF DC OR RELAY HARDWARE ALARM.
 • SITE IS LIMITED TO 2660KW EXPORT.

- UTILITY INTERCONNECTION NOTES:**
- TRANSFORMER TO BE WYE-GROUND PRIMARY AND DELTA SECONDARY.
 - PROTECTIVE RELAYS TO HAVE DC BATTERY BACKUP WITH AC POWERED BATTERY CHARGER FOR BACKUP.
 - PROTECTIVE RELAY ALARM CIRCUIT TO BE WIRED OR PROGRAMMED TO TRIP SWITCH FOR REDUNDANCY PER EVERSOURCE REQUIREMENTS. FOR SEL RECLOSER THE ALARM WORD BIT IS USED TO TRIP (AND BLOCK CLOSE) ON LOSS OF DC POWER. BTFAIL IS USED FOR BATTERY FAILURE. LOSS OF 120VAC POWER TO THE RELAY WILL TRIP AND BLOCK/CLOSE. TRIP WILL BE IN LESS THAN 2.0 SECONDS.
 - TRANSFORMER FUSES TO BE COOPER BAY-O-NET STYLE. CAT#4000353C17 FOR 140A FUSES
 - PV SYSTEM WILL HAVE A 5-MINUTE HEALTHY GRID RECONNECT FEATURE PROGRAMMED INTO THE RECLOSER. THIS WILL BE PROGRAMMED INTO THE RECLOSER TO DEFEAT THE CLOSE BUTTON AND BLOCK CLOSE UNTIL THE 5 MINUTE TIMER HAS COMPLETED. SETTINGS WILL BE PER IEEE 1547 SECTION 4.2.6 FOR 5 MINUTES. VOLTAGES WILL BE WITHIN ANSI C84.1 TABLE 1, RANGE B 12.54-13.86KV (95-105% OF 13.2KV BASE) AND FREQUENCY WILL BE WITHIN 59.5-60.5HZ. THE 5 MINUTE TIME INTERVAL WILL RESTART IF VOLTAGE OR FREQUENCY FALLS OUT OF THIS WINDOW
 - CUSTOMER ELECTRICAL EQUIPMENT WILL BE SERVICE-ENTRANCE RATED AS IS REQUIRED BY THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC).
 - INVERTERS (PV & BESS) WILL OPERATE ONLY AT UNITY (1.0) POWER FACTOR. INVERTERS TO BE UL1741-SA COMPLIANT. BESS RAMP RATE TO BE 2.0% = 53.2KW/SEC.
 - NO EVERSOURCE EQUIPMENT ON POLES WITH CONDUCTORS ALIGNED MORE THAN 2 DEGREES. MINIMUM 50' SPACING BETWEEN EVERSOURCE POLES. EVERSOURCE POLES TO BE NO MORE THAN 10' FROM ACCESS ROAD.

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FOR INTERCONNECTION ONLY - NOT FOR CONSTRUCTION

2,660KW PV SYSTEM WITH 2,062.5KW DC COUPLED ENERGY STORAGE LIMITED TO 2,660KW AC TOTAL OUTPUT

3 7/1/2022 REVISED NGR SIZE 2 6/6/2022 REVISED NGR SIZE 1 4/5/2021 REVISED TO INCLUDE POLE NUMBER 0 2/9/2021 ISSUED FOR REVIEW AND UTILITY APPLICATION		PROJ. MANAGER: CHIEF DESIGNER: REVIEWED BY: DATE			SCALE: HORIZ.: NONE VERT.:	POWER ENGINEERS, LLC Duxbury, MA 02332 (508) 612-0382 www.PowerEngineersLLC.com <i>Electrical Engineering, Power, Lighting, Technical Studies and Utility Consulting</i>	WARREN FARMS SOLAR, LLC 2660KW AC PV/ESS WARREN FARMS PROJ. PV / ESS ONE-LINE DIAGRAM	PROJ. No.: 307S DATE: FEBRUARY 2021
REVISIONS		REVISIONS			DATUM: HORIZ.: VERT.: 		SIZE: D REV: 3	