

HV ELECTRICAL  
SITE OVERVIEW

SCALE 1:500 @ A2



LEGEND

- O/H 11kV CONDUCTOR
- NEW PRIVATE 11kV OH CONDUCTOR
- NEW 11kV U/G CABLE
- NEW GMK RECLOSER
- SUNGROW PV MVIP STATION SG3400
- SUNGROW BESS UNIT - SG-2752UX

WORK AS EXECUTED

COMPANY: \_\_\_\_\_  
WORK COMPLETED: \_\_\_\_\_  
SIGNED: \_\_\_\_\_  
DATE COMPLETED: \_\_\_\_\_

Sustainable Energy  
Design P/L

Ph: (02) 6361 7567  
Email: projects@sed.net.au  
Postal Address: PO Box 2129  
ORANGE NSW 2800  
1/10 HAWTHORN PL  
ORANGE NSW 2800  
ASP Accreditation No: 2659

Client: Cabonne Council  
99-101 Bank St  
Molong NSW 2866



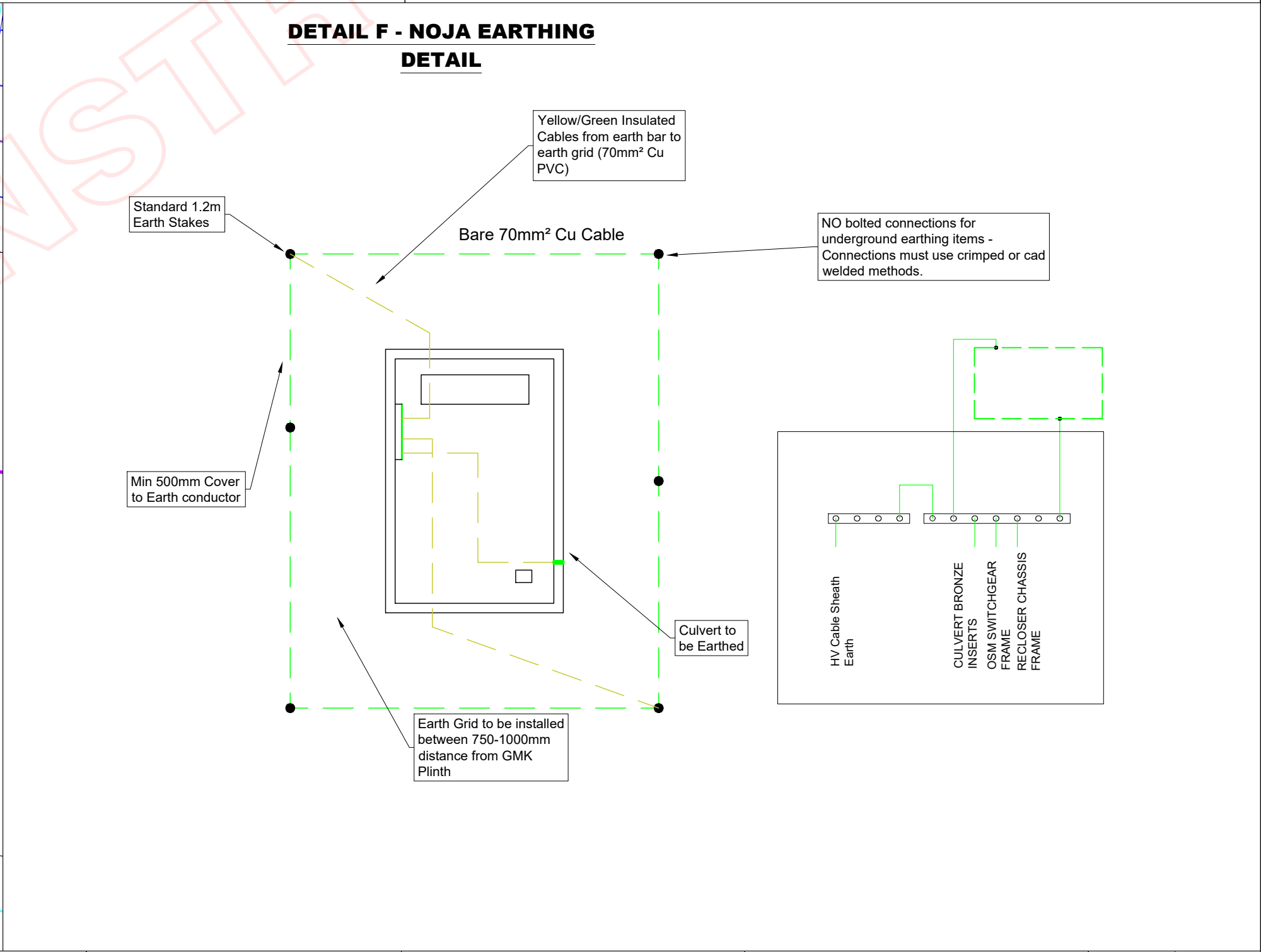
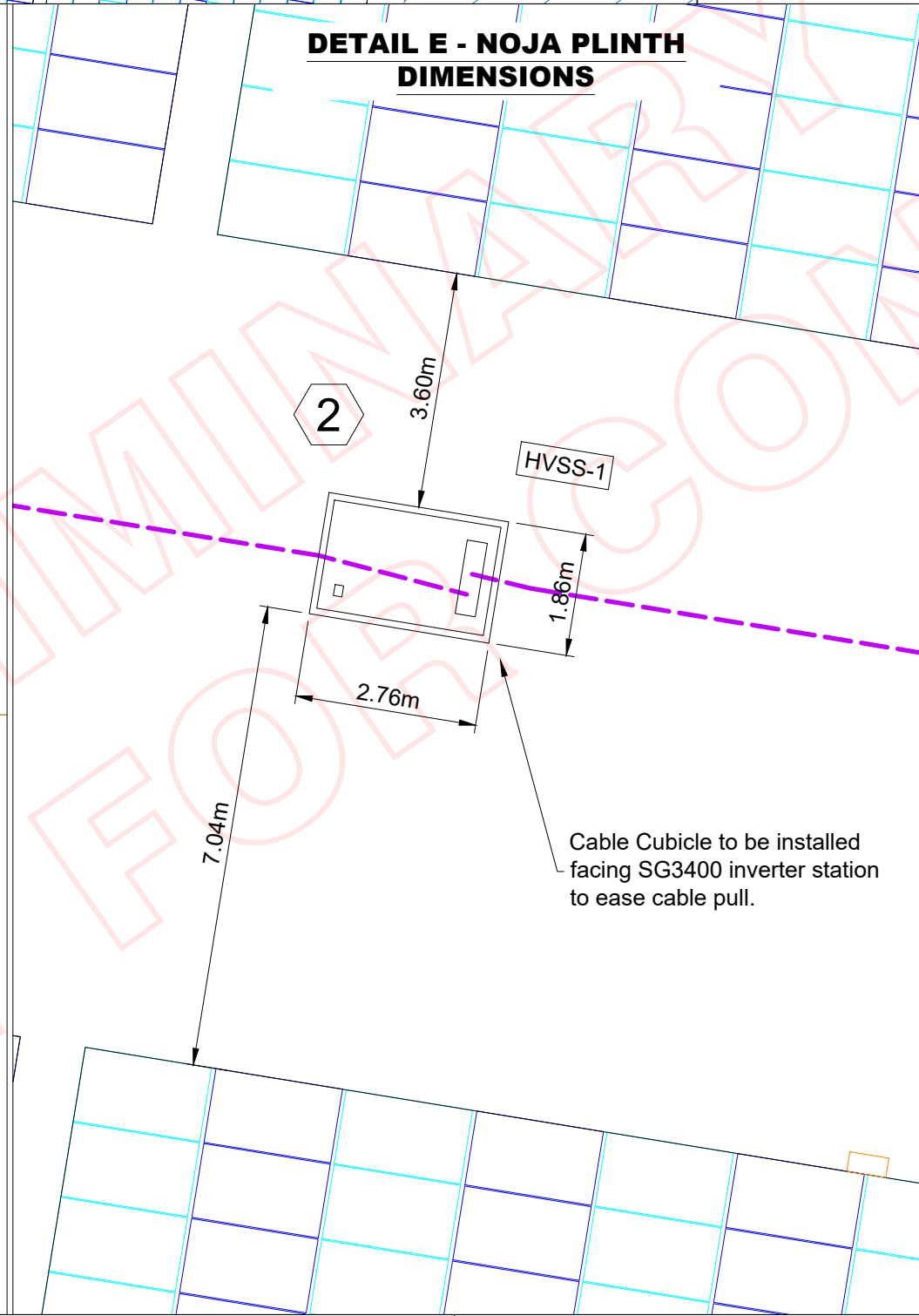
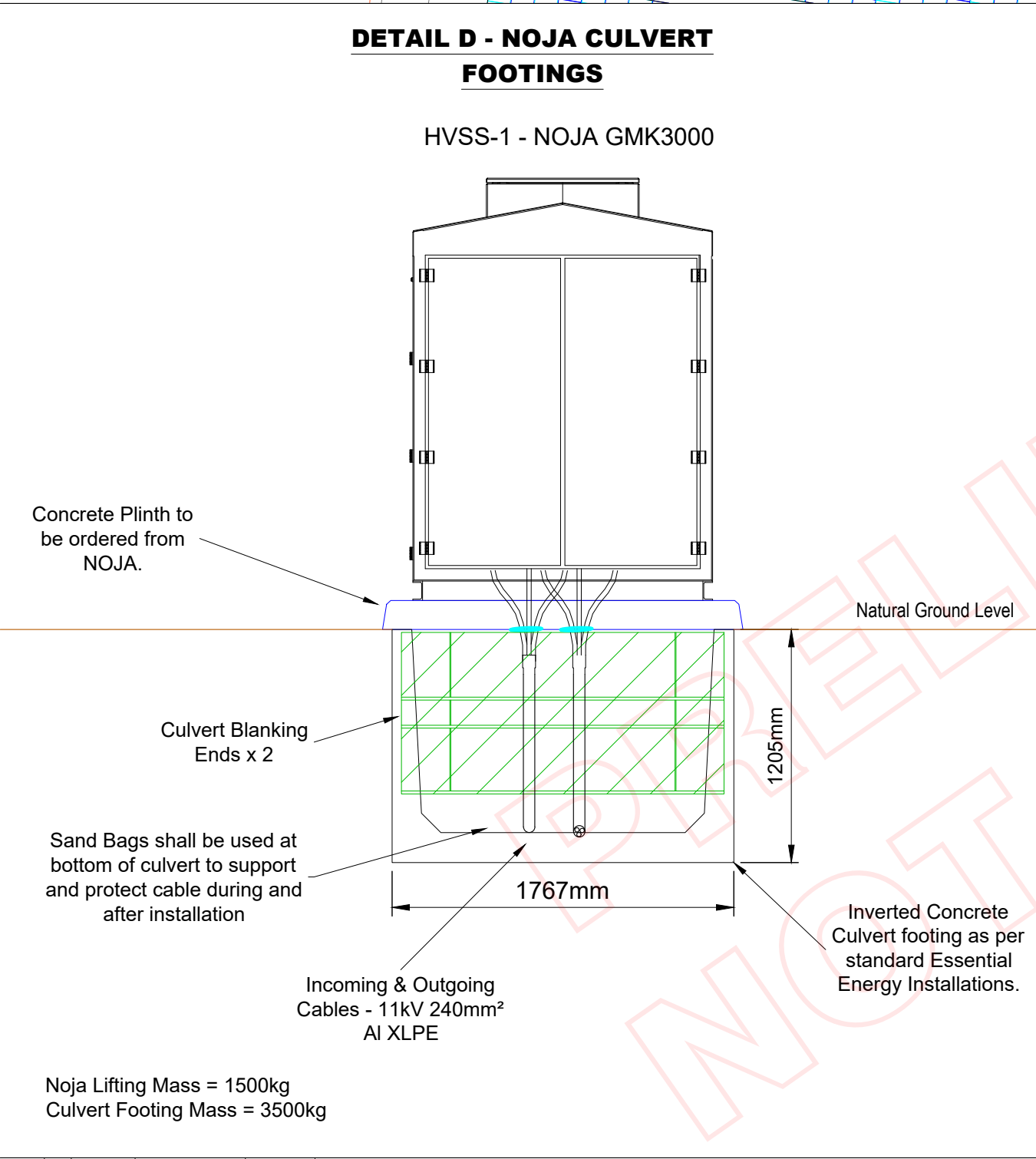
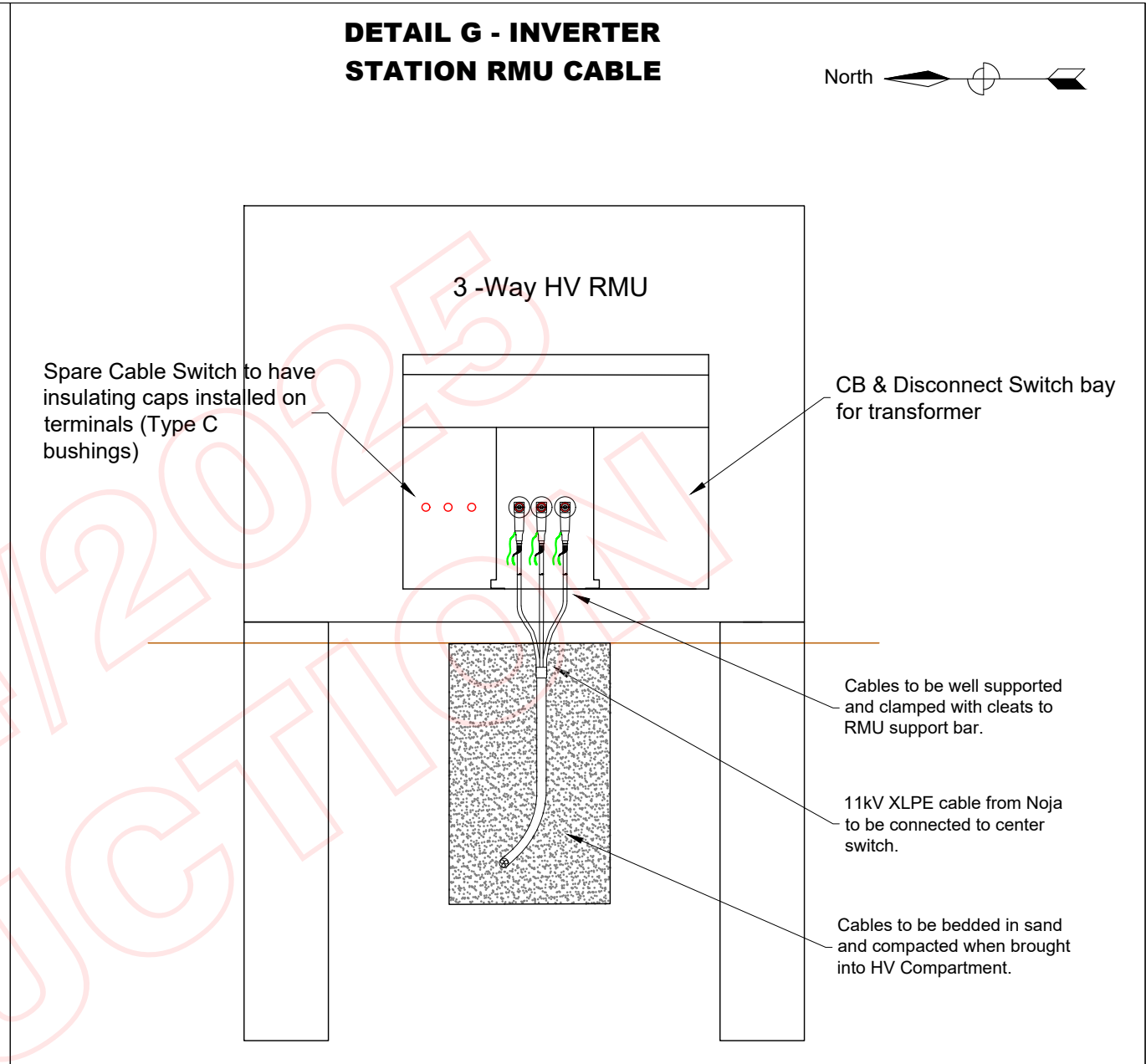
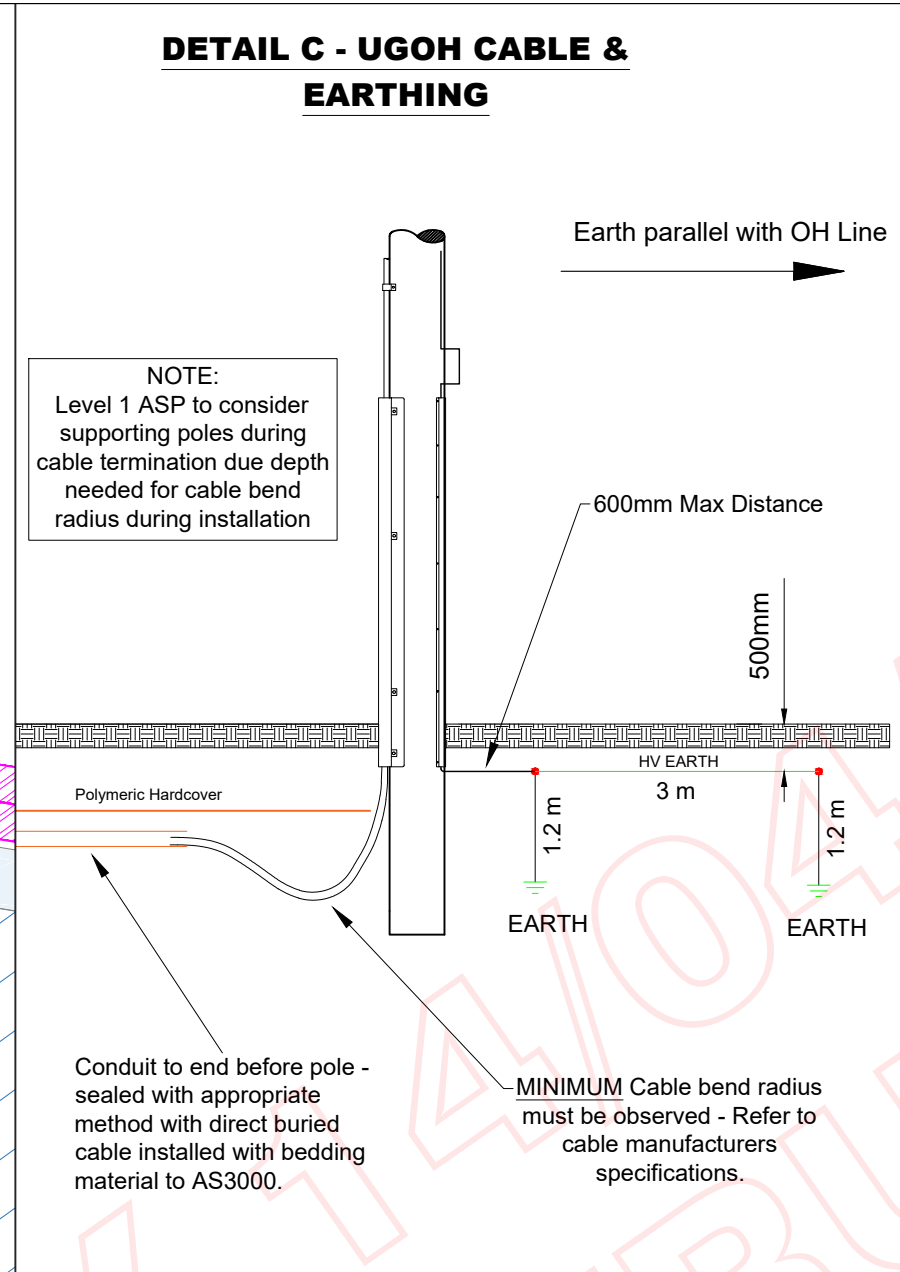
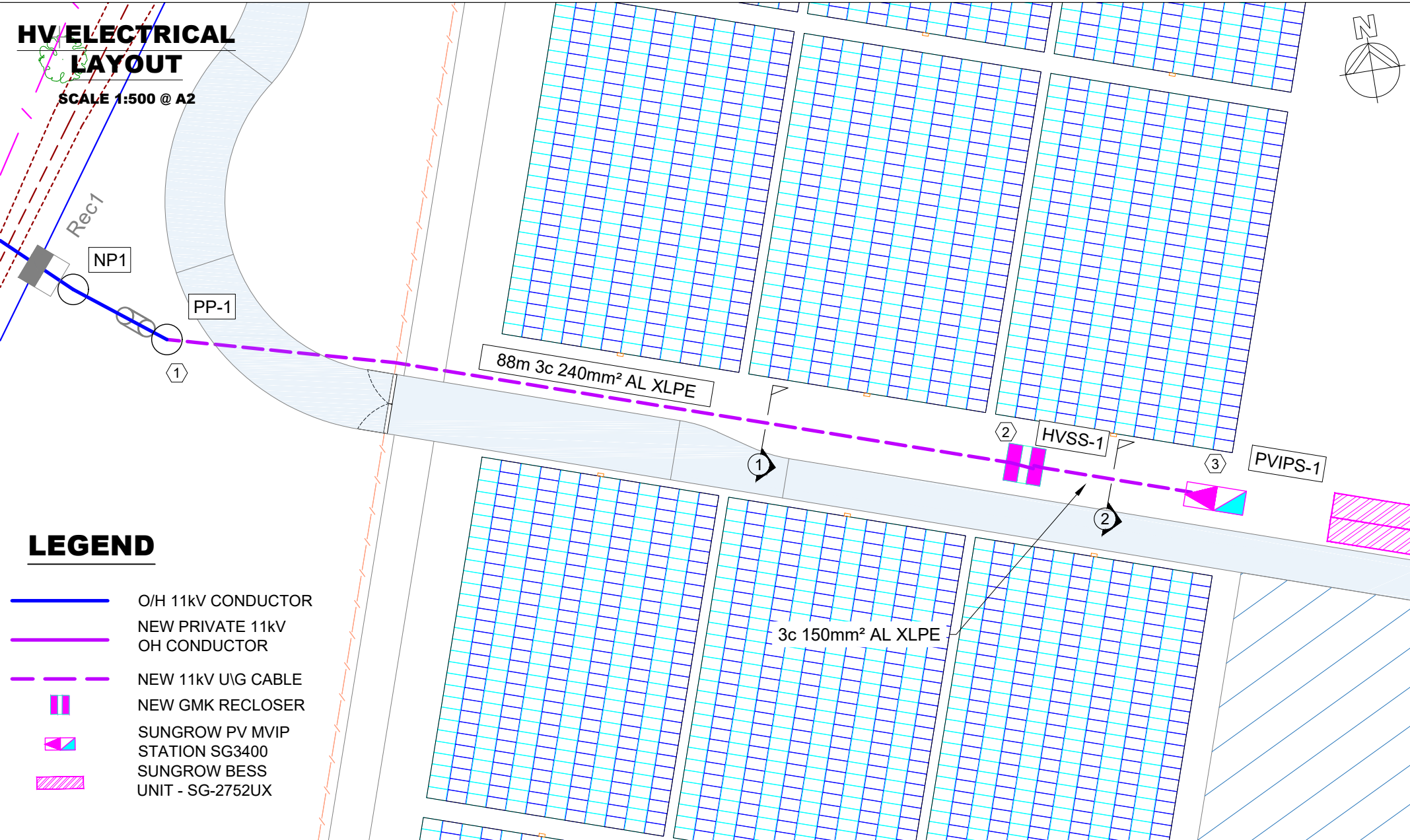
Job Title: EUGOWRA SOLAR FARM  
DC DESIGN

Sheet Title: HV Electrical Design - Site  
Overview

Site Address: Eugowra Sewerage Treatment Plant  
255 Casuarina Drive  
Eugowra NSW 2866

Scale	1:1000
Drawn	APT
Checked	MJD
Designed	MJD
Date Issued	18/03/25
Version	0.4
SED Project No	S2456
SHEET 1 OF 7	
Sheet Reference:	A2
S2456-ELE-HV-01	





Rev.	Date:	By:	Changes:
0.1	19/12/2024	APT	PRELIMINARY RELEASE 0.1
0.2	28/01/2025	APT	Release for Council Comment on access roads and fencing.
0.3	18/03/2025	APT	Added Legend
0.4	14/04/2025	APT	Release for Tendering Purpose
0.5	ZZ/ZZ/ZZZZ	APT	ZZZZ

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NAME (Block Letters)

SIGNED: \_\_\_\_\_

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1/10 HAWTHORN PL  
ORANGE NSW 2800  
Office Site: \_\_\_\_\_  
ASP Accreditation No: 2659

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99-101 Bank St  
Molong NSW 2866

Job Title: **EUGOWRA SOLAR FARM DC DESIGN**

Sheet Title: HV Electrical Design - Detail

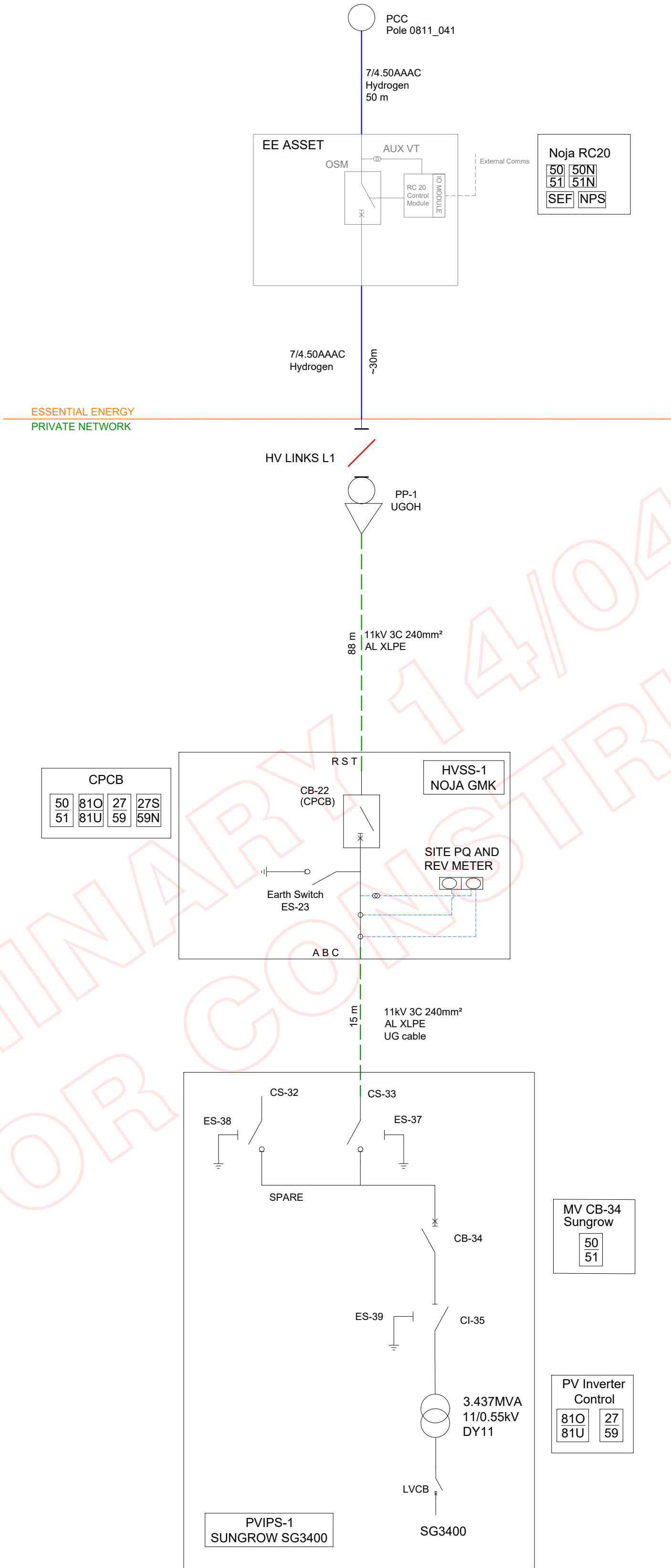
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SHEET	2 OF 7
Sheet Reference:	S2456-ELE-HV-02

**A2**

POC Fault Current 1PH/E = XXA

PYB 3B1 Eugowra 11kV distribution feeder



Metering Specifications


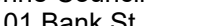
- Voltage Insulation Level - 11kV/50kV/150kV as per AS 2067 Table 3.1
- CURRENT TRANSFOMER:
  - CLASS: 0.5S
  - CT RATIO: 300/5
  - SPECIFICATION: AS 60044-1
  - FREQUENCY: 50Hz
  - SECONDARY OUTPUT: 5A
  - MAXIMUM BURDEN: 5VA
- VOLTAGE TRANSFORMERS:
  - CLASS: 0.5S
  - SPECIFICATION: AS 60044-2
  - FREQUENCY: 50Hz
  - SECONDARY VOLTAGE: 110V/√3
  - MAXIMUM BURDEN: 50VA
- ALL METERING UNITS TO HAVE NATA CERTIFIED TEST CERTIFICATES.

HV PROTECTION REQUIREMENTS

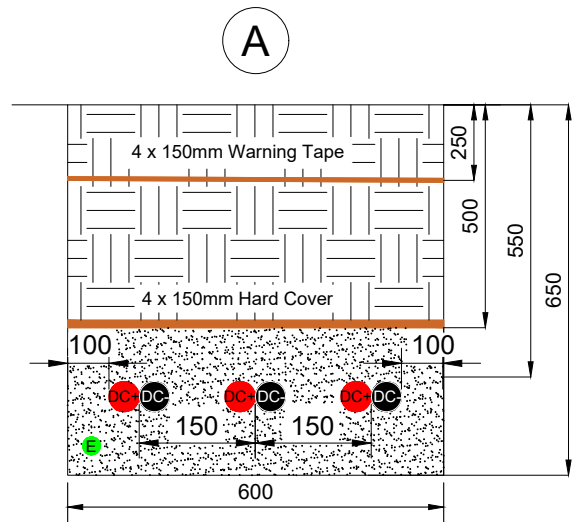
50	Instantaneous Overcurrent
51	Time Overcurrent
50N	Instantaneous Earth Fault
51N	Time Earth Fault
27	Under Voltage
59	Over Voltage
81O	Over Frequency
81U	Under Frequency
SEF	Sensitive Earth Fault
27s	DC undervolts 5
9N	Neutral Displacement Voltage

Notes

- The Revenue Meter will be used as LGC metering. This site operates without a PPC, hence no feed back required from the PQ meter. PQ Meter is required to be accessed remotely to check PQ Parameters are within Connection Agreement Limits.
- For Protection Settings - refer to HV Protection study "Rev 00 Eugowra Internal Protection study\_12.11.2024" Appendix A

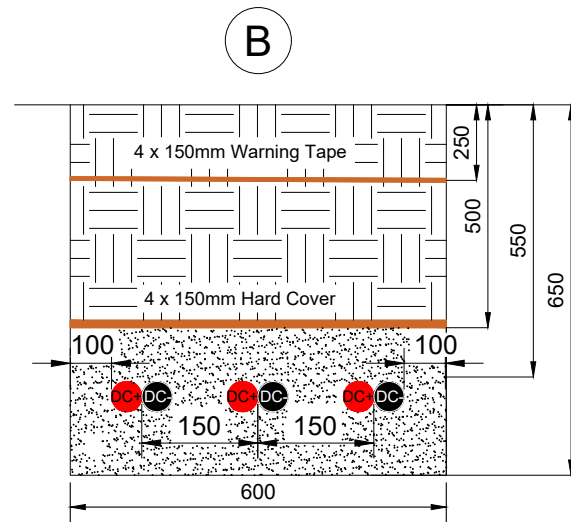
CAD DRAWING DO NOT MANUALLY AMEND AMENDMENTS	Rev.	Date:	By:	Changes:	<div><div>Sustainable Energy</div><div>Design P/L</div><div>Ph: (02) 6361 7567</div><div>Email: projects@sed.net.au</div><div>Postal Address: PO Box 2129</div><div>ORANGE NSW 2800</div><div>Office Site: 1/10 HAWTHORN PL</div><div>ORANGE NSW 2800</div><div>ASP Accreditation No: 2659</div></div> <div><div><div><div></div><div></div><div></div></div><div></div></div></div>	Client:	Cabonne Council 99-101 Bank St Molong NSW 2866	Job Title:	EUGOWRA SOLAR FARM DC DESIGN		Scale	NA
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	0.5	ZZ/ZZ/ZZZZ	APT	ZZZZ				Version	0.4			
							SED Project No	S2456				
					SHEET 3 OF 7		A2					
					Sheet Reference:							
					S2456-ELE-HV-03							





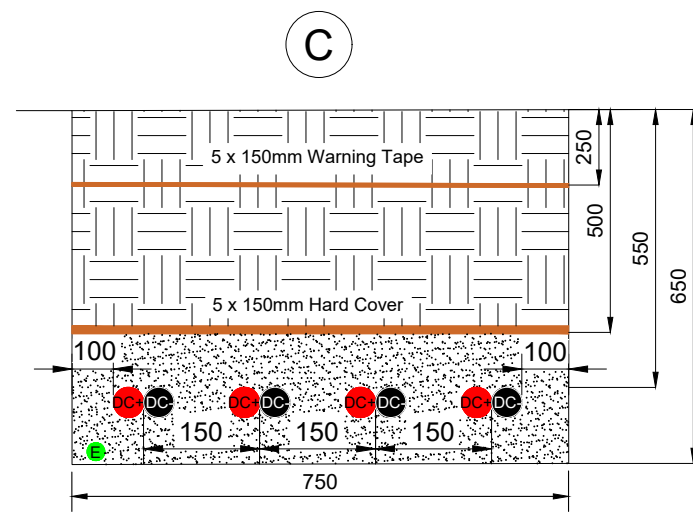
6 x 1C SDI (3 Pairs) 1500V DC 240mm<sup>2</sup> AL XLPE (Direct Buried)  
1 x 1C 70mm<sup>2</sup> Cu Yellow/Green Covered PVC Earth Cable

Cables to be bed in thermal sand - Minimum 50mm surrounded in all directions

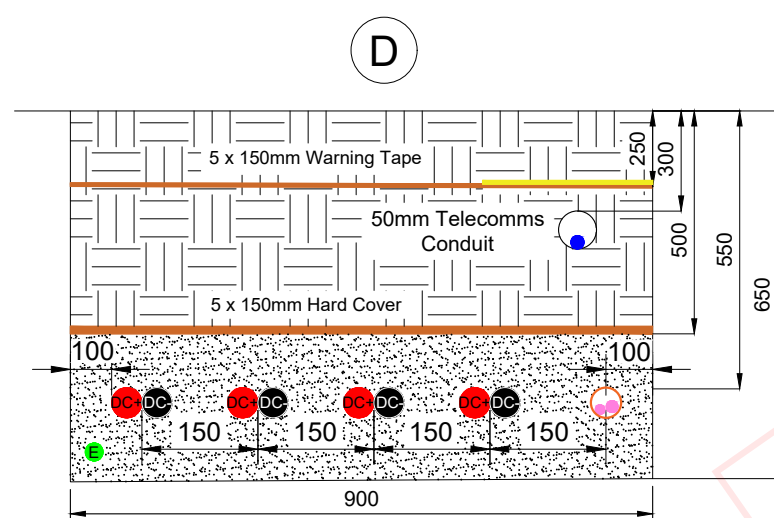


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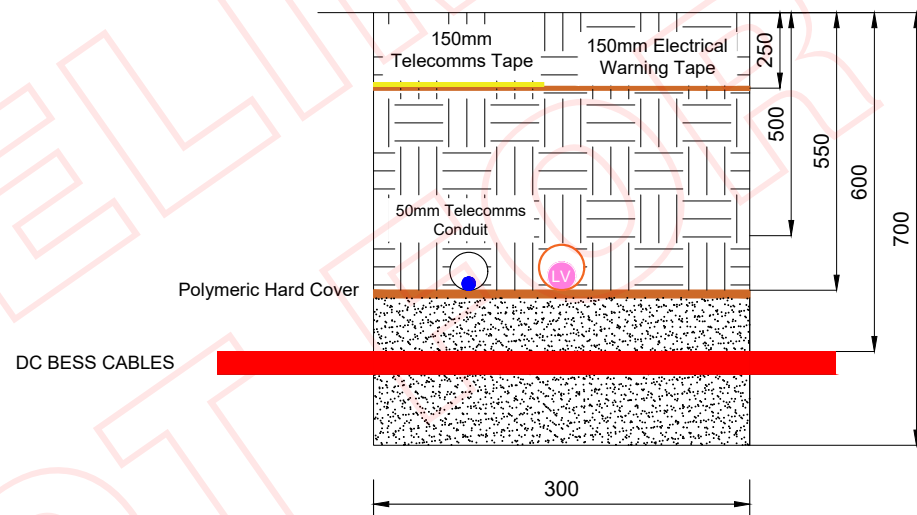


4 x 1C SDI (6 Pairs) 1500V DC 300mm<sup>2</sup> Cu XLPE (Direct Buried)  
1 x 1C 70mm<sup>2</sup> Cu Yellow/Green Covered PVC Earth Cable



4 x 1C SDI (6 Pairs) 1500V DC 300mm<sup>2</sup> Cu XLPE (Direct Buried)  
1 x 1C 70mm<sup>2</sup> Cu Yellow/Green Covered PVC Earth Cable  
1 x 4C+E 25mm<sup>2</sup> Cu 600/1000v Cable In Conduit (TBC)  
1 x 2C+E 2.5mm<sup>2</sup> Cu 600/1000v Cable in Conduit (TBC)  
1 x 50mm Orange HD Electrical Conduit  
1 x 50mm White Telecomms Conduit

### TYPICAL LV/1500V DC Cable Crossing

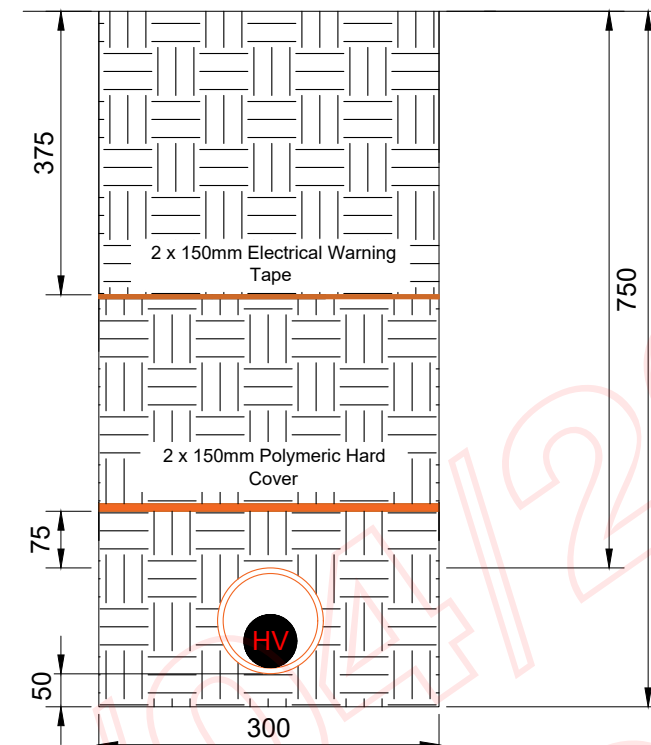


LV Cable to be in HD PVC Conduit for CATEGORY A Wiring System.

Minimum Depth of Cover for Telecomms Conduit to be 300mm

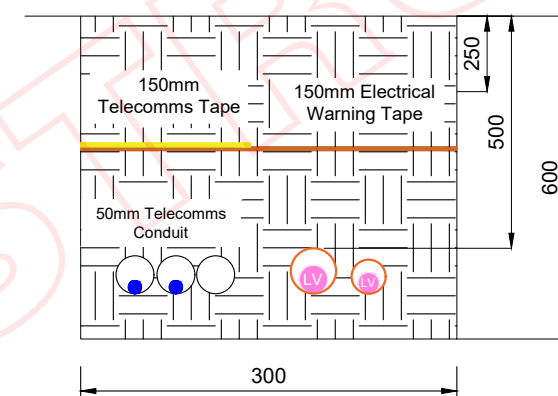
Minimum 50mm Clearance to DC 1500V Cables

### HV Only Trench Section 1



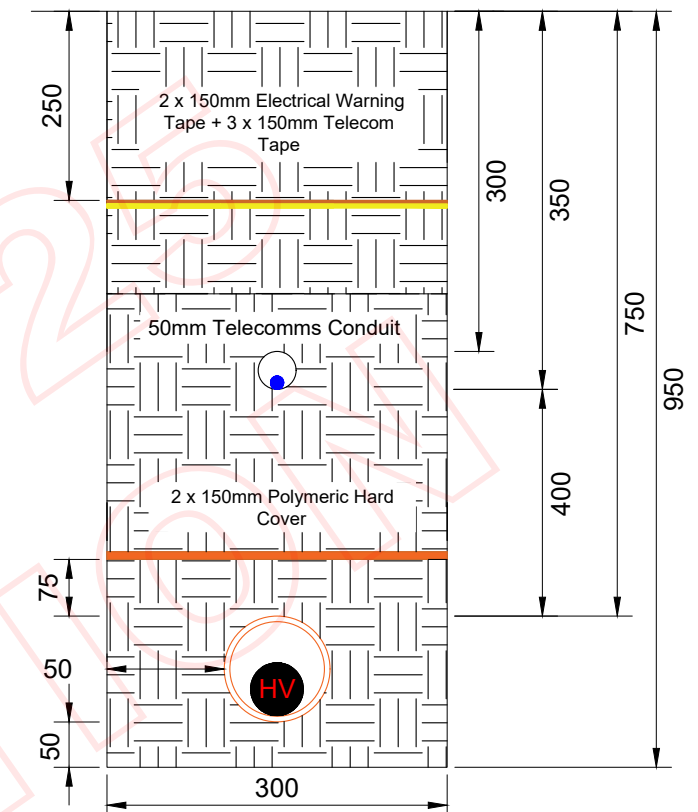
1 x 125mm LD Orange PVC Conduit (HV)  
1 x 240mm<sup>2</sup> AL XLPE 11kV Cable

### Trench Section 3



3 x 50mm White Telecommunications Conduit  
1 x 50mm HD Orange PVC Conduit  
1 x 25mm<sup>2</sup> Cu 4C+E 600/1000v XLPE Cable In Conduit  
1 x 32mm HD Orange PVC Conduit  
1 x 2.5mm<sup>2</sup> Cu 2c+E 600/1000v Cable In Conduit

### HV & Communication Shared Trench Section 2

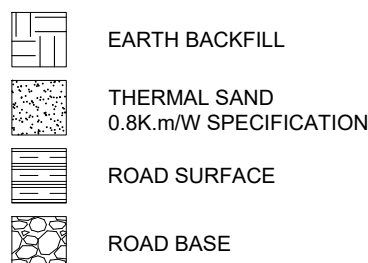


1 x 50mm White Telecommunications Conduit  
1 x 125mm LD Orange PVC Conduit  
1 x 240mm<sup>2</sup> AL XLPE 11kV Cable  
1 x Cat 5e (MIN) STP Cable

## NOTES

- Electrical warning tape to extend the full width of the trench
- 50mm Minimum separation between Cables crossing 1500V DC Cables with hardcover protection for the DC Cables.
- Minimum depth for Telecommunications Conduits is 300mm.

### TRENCH LEGEND



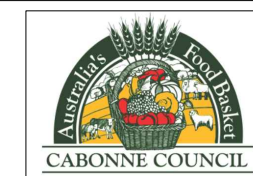
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1/10 HAWTHORN PL  
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Office Site: \_\_\_\_\_  
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Client: Cabonne Council  
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Job Title: **EUGOWRA SOLAR FARM DC DESIGN**

Sheet Title: Trench Sections - HV Design


Site Address: Eugowra Sewerage Treatment Plant  
255 Casuarina Drive  
Eugowra NSW 2866

Scale	Drawn	APT
Checked	MJD	
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Date Issued	18/03/25	
Version	0.4	
SED Project No	<b>S2456</b>	
SHEET	4 OF 7	
Sheet Reference:	S2456-ELE-HV-04	
		<b>A2</b>

HV UNDERGROUND CONSTRUCTION SCHEDULE

SITE NO.	ASSET LABEL	EssE STANDARD DRAWING No.	ASSEMBLY No.	CONSTRUCTION NOTES	ORDER NUM.	SUPPLIER / MANUFACTURER	QTY
1	PP-1	CEOM7204.35	1	INSTALL NEW HV UGOH ON NEW POLE. ENSURE MIN BENDING RADIUS OF CABLE MANUFACTURER IS FOLLOWED	-	-	-
		CEOM7204.11	1	INSTALL PVC CABLE GUARD	-	-	-
		CEOM7207.08	1	INSTALL 2 x EARTH RODS AND 70mm BARE CU CABLE EARTHING - REFER TO DESIGN PLANS FOR SPACINGS	-	-	-
11	HVSS-1			INSTALL NEW NOJA 3000 GROUND MOUNTED RECLOSER WITH 1 x OSM UNITS SPECS - 12kV 630A GMK WITH - NOJA OSM + 1 x RC10 - EARTH SWITCH - CONCRETE PLINTH - 6 x CT & CORRESPONDING TEST BLOCK TERMINALS - 3 x VT & METERING TEST BLOCK TERMINALS - ON THE SOURCE SIDE BUS BARS FOR CONNECTION TO CUSTOMER POWER QUALITY METER & REVENUE METERS.  REFER TO HV SCHEMATIC FOR PROTECTION & METERING SPECIFICATIONS. POWER QUALITY METER (SCHNEIDER ION9000/SATEC PM180 OR EQUIVALENT) WITH CAPABILITY TO EXPORT DATA VIA MODBUS TCP FOR CONNECTION INTO PLANT SCADA SYSTEM & REMOTELY ACCESSSES/MONITORED. TO BE FREE ISSUED TO NOJA FOR INSTALLATION INTO COMMUNICATIONS/METERING CABINET. REFER TO HV SCHEMATIC FOR METERING SPECIFICATIONS.  PQ METER TO BE CAPABLE OF MEASURING UP TO 40TH HARMONIC AND MEET PROJECTS CAS REQUIREMENTS TO FLAG AN ABNORMAL POWER QUALITY CONDITION AND COMMUNICATE THIS TO SITE SCADA. HV REVENUE METERING SYSTEM TO BE ORDERED FROM METERING RETAILER FOR INSTALLATION INTO COMMUNICATIONS/METERING CABINET. REFER TO HV SCHEMATIC FOR METERING SPECIFICATIONS - CT'S TO BE NATA METERING GRADE WITH TEST CERTIFICATION & HV METER NMI APPROVED FOR USE AS BILLING REVENUE METERING.	-	NOJA	1
				EXCAVATE AND INSTALL RECLOSER CULVERT 1x 1500W x 1050H x 2460L (INTERNAL DIMENSIONS) CULVERT - EST. WEIGHT 3500Kg	286694	SOUTHERN PRECAST OR THE VERSATILE TANK COMPANY	1
				2 x 1734x850 CULVERT BLANKING ENDS	CE1765-03	BLACKPOLY PTY	2
				11KV AI XLPE CABLE TRIFURICATION KIT (FOR CABLE CHOSEN	-	-	2
				CABLE DEADBREAK ELBOW - BOLTED CONNECTOR KIT FOR UPTURNED CABLE - 630A RATED 11kV NEXANS EUROMOULD INTERFACE TYPE C OR EQUIVALENT MANUFACTURER - FOR 240mm² AL XLPE CABLE	-	630A TYPE C CONNECTORS FOR 240mm² AL	3
				CABLE DEADBREAK ELBOW - BOLTED CONNECTOR KIT FOR UPTURNED CABLE - 630A RATED 11kV NEXANS EUROMOULD INTERFACE TYPE C OR EQUIVALENT MANUFACTURER - SELECT FOR CABLE SIZE SELECTED (150mm² MINIMUM CABLE SIZE)	-	630A TYPE C CONNECTORS	3
				INSTALL GMK EARTHING RING - ENSURING TO BOND CULVERT TO HV EARTH BAR - REFER TO HV DESIGN DRAWINGS FOR DETAILS. HV CABLE SCREEN TO BE EARTHED	-	-	-
				FOR SUNGROW SG-3400 PV INVERTER POWER STATION SPECIFICATIONS REFER TO PV SOLAR FARM DESIGN DRAWINGS.	-	-	-
				INVERTER FOOTINGS TO BE CONSTRUCTED AS PER DRAWING SPECIFICATIONS AS A MINIMUM WITH STRUCTURAL ENGINEER DESIGNED PIERS. SUNGROW INVERTER STATION CONTAINER TO BE CRANED AND ATTACHED TO CONCRETE PIERS AS PER DRAWINGS. CAN BE ATTACHED WITH BY WELDING TO CEMENTED IN C-CHANNEL OR BOLTED WITH SUNGROW SUPPLIED BRACKETS.	-	-	-
				CABLE DEADBREAK ELBOW - BOLTED CONNECTOR KIT FOR UPTURNED CABLE - 630A RATED 11kV NEXANS EUROMOULD INTERFACE TYPE C OR EQUIVALENT MANUFACTURER. - SELECT FOR CABLE SIZE SELECTED (150mm² MINIMUM CABLE SIZE)	-	630A TYPE C CONNECTORS	3
17	PVIPS-1			3 X TYPE C BUSHING CAPS FOR SPARE CABLE SWITCH - INTERFACE TYPE C	-	630A TYPE C CONNECTORS	3
				11KV AI XLPE CABLE TRIFURICATION KIT (FOR CABLE CHOSEN	-	-	1
				INSTALL EARTHING RING - ENSURING TO BOND CULVERT TO HV EARTH BAR - REFER TO HV DESIGN DRAWINGS FOR SOLAR FARM EARTHING DETAILS. HV CABLE SCREEN TO BE EARTHED	-	-	-
				INSTALL CABLE MARKER WARNING POST AT FENCE CROSSING OF HV CABLE	-	-	1
VARIES	-	-	-				

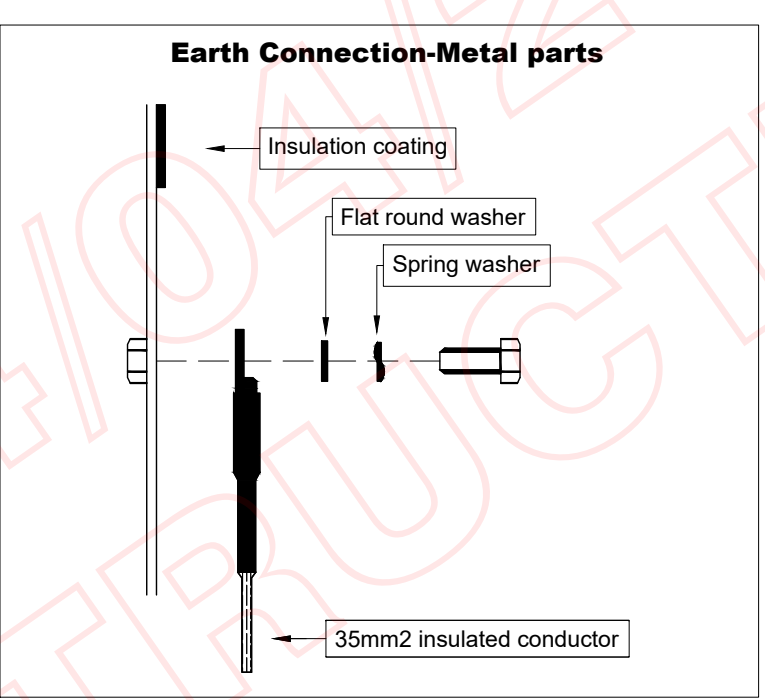
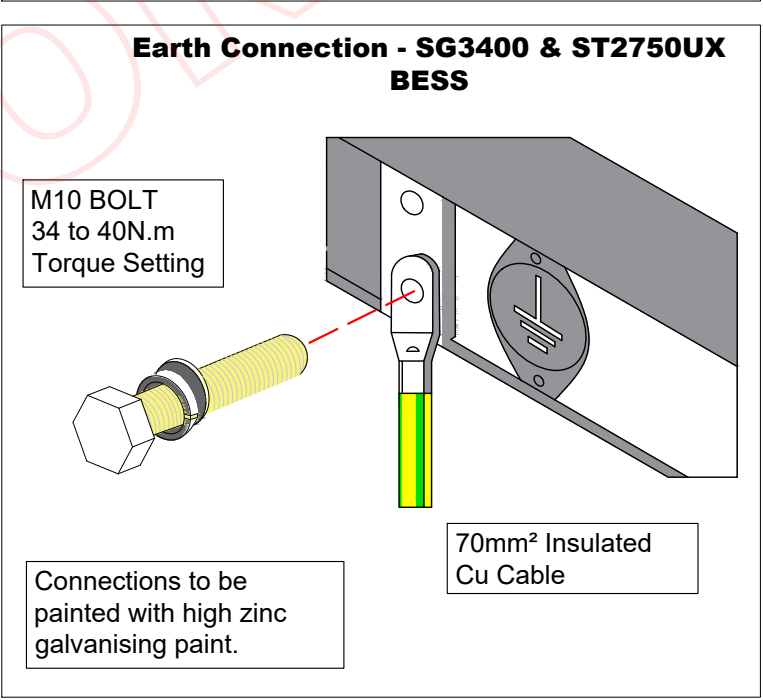
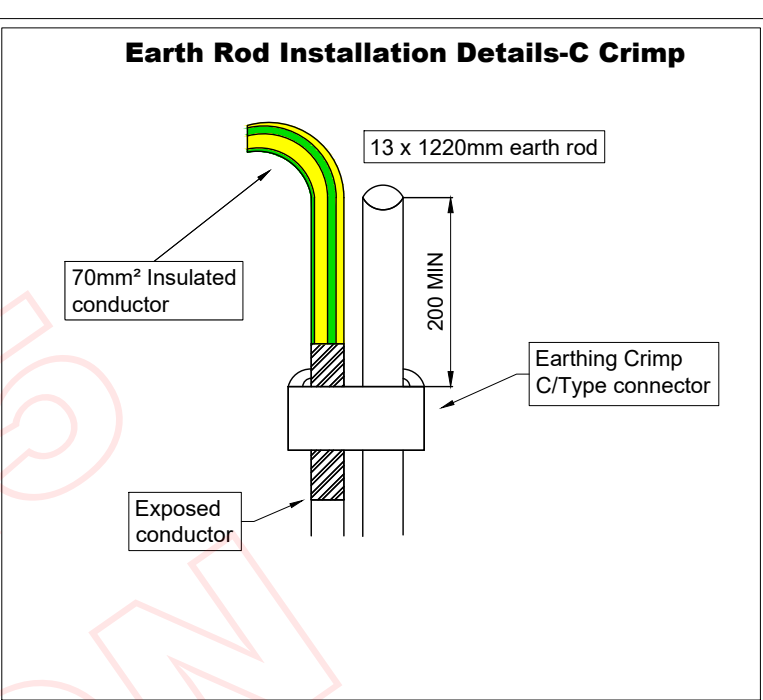
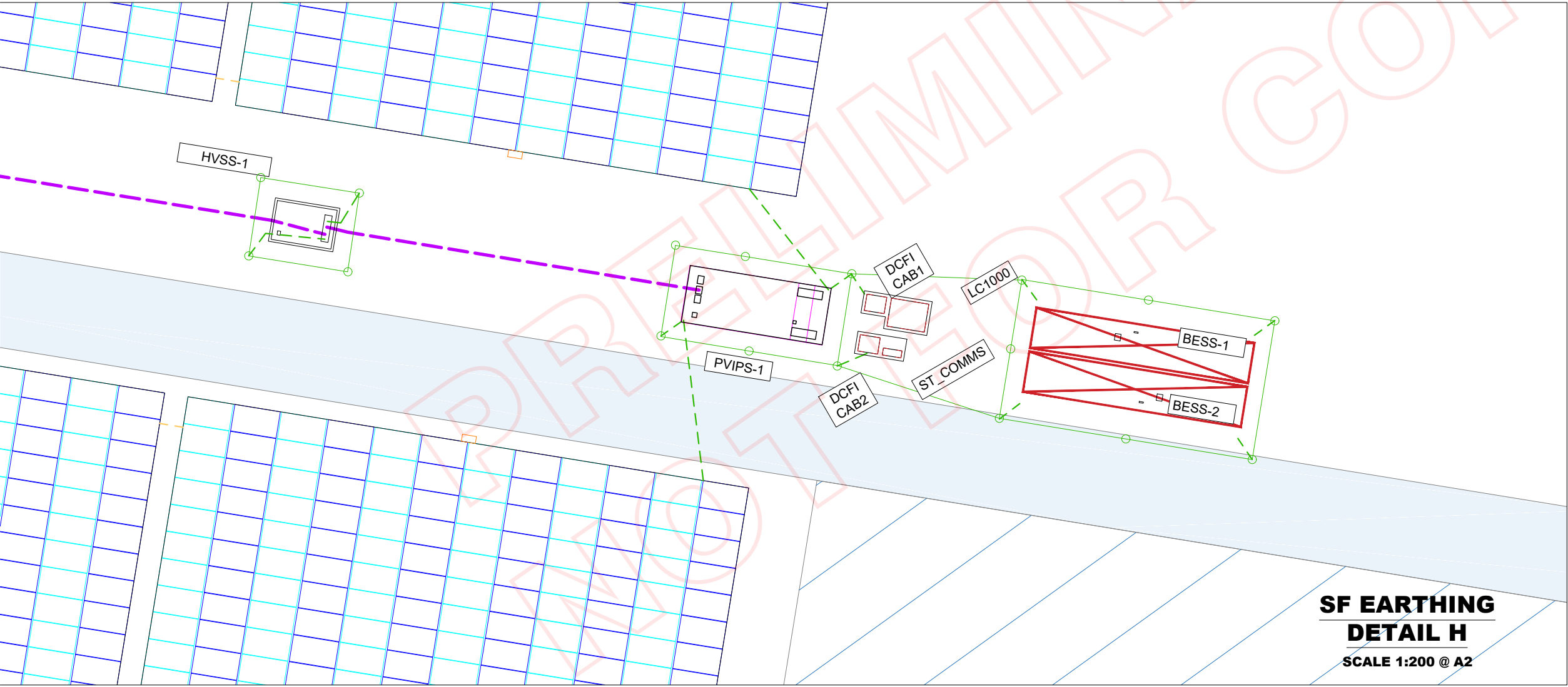
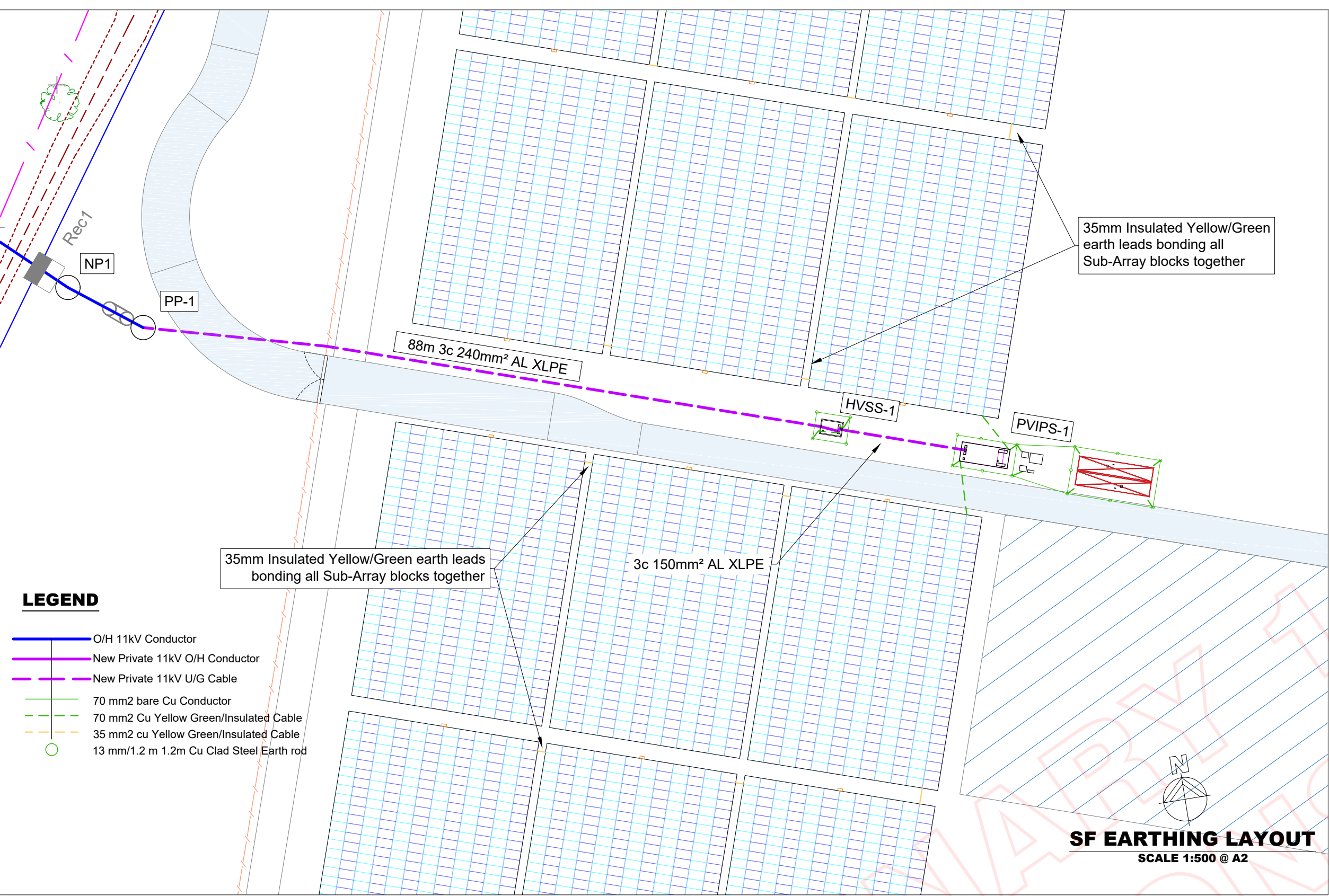
HV UNDERGROUND CABLE & CONDUIT SCHEDULE					
FROM	TO	CABLE DETAILS	ROUTE LENGTH (m)	LENGTH (m) EST.	
PP-1 (PEG 1)	HVSS-1 (PEG 2)	INSTALL 11kV 3C 240mm² AI TR-XLPE - (FAULT LEVEL MIN 5kA) - CABLE TO BE INSTALLED IN 125mm LD CONDUIT. (3 X SINGLE CORE CABLES ALSO ACCEPTABLE)	88	118	
HVSS-1 (PEG 2)	PVIPS-1 (PEG 3)	INSTALL 11kV 3C 150mm² AI TR-XLPE MINIMUM SIZE OR EQUIVALENT - (FAULT LEVEL MIN 5kA) - CABLE TO BE INSTALLED IN 125mm LD CONDUIT. (3 X SINGLE CORE CABLES ALSO ACCEPTABLE)	16	26	
		INSTALL 1 x 50mm WHITE TELECOMMS CONDUIT	16		
PROJECT TOTAL			TOTAL CABLE EST. (m)		
11kV 3C 240mm²AI TR-XLPE			118		
11kV 3C 150mm²AI TR-XLPE OR EQUIVALENT			26		
125mm LD ORANGE PVC CONDUIT			104		
1 x 50mm WHITE TELECOMMS CONDUIT			16		

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	0.1	19/12/2024	APT	PRELIMINARY RELEASE 0.1	COMPANY: _____  WORK COMPLETED: _____ NAME (Block Letters)  SIGNED: _____  DATE COMPLETED: _____	<div>EUGOWRA SOLAR FARM DC DESIGN</div>			Drawn	APT	
	0.2	28/01/2025	APT	Release for Council Comment on access roads and fencing.					Checked	MJD	
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	0.5	ZZ/ZZ/ZZZZ	APT	ZZZZ					Version	0.4	
						SED Project No			<b>S2456</b>	SHEET 5 OF 7	
							Sheet Reference:				
							S2456-ELE-HV-05		A2		
								Eugowra Sewerage Treatment Plant 255 Casuarina Drive Eugowra NSW 2866			









## NOTES

Please refer to Rev00 Eugowra SF Earthing Study for further details.

- The contractor should verify the continuity of all earth cables.
- No bolted connection to be direct buried. Crimped connections should be used instead.
- All metallic structures in the vicinity of the solar farm shall be equi-potential bonded to the main earth grid.
- The solar farm fence shall NOT be bonded to the main earth grid.
- Earth grid to be installed at a distance of MIN 750mm to MAX 1000mm distance from the HV equipment.
- All buried earth cables shall be 500mm below the ground and shall have warning tape laid over the trench 250mm below the surface.
- If cable trays are used to support DC Collector Cables - these shall be physically bonded to Inverter earth using 35mm² Yellow Green Cu cable.
- All sub-arrays sections to have bolted earth connections between each sub-array with 35mm² Cu Cable ensuring solar farm metal work is bonded continuously.
- All HV equipment and battery containers are to have a grading ring installed using 70mm² bare copper conductor as earth grid buried 500 mm deep with 750 mm offset from the respective equipment's.
- The earth grids for UGOH and POC recloser poles should be using 70mm² cu bare conductor.
- All above ground bonding inside the solar farm should be using 35mm² Cu Yellow Green insulated conductor.
- The external bonding conductor for Inverter and Batteries to earth grid should be 70mm² Cu Yellow Green insulated conductor.
- All HV equipment including Noja GMK, Inverter as well as batteries should be double bonded to the Earth Grid.
- Concrete Plinth for DC Switching Equipment and LC1000 should have rebar connection tabs cast for connecting equipment earth and also tied into the local earth grading ring.
- All above ground bonding on the UGOH at site 1 should be 70mm² Cu Yellow Green insulated conductor.
- The earth rods used are 13 x 1220mm Cu Clad rods.
- The HV cable shield to be end to end bonded at the UGOH pole, Noja GMK and Inverter.
- The HV UGOH is located outside the solar farm fence with its earth grid bonded to the solar farm earth via the HV cable shield. The HV UGOH earths will be as per Essential Energy drawing CEOM 7207.08.
- DC combiner box Earths in the solar farm field should be bonded using 35mm² yellow green insulated conductor. PV Array to be checked for earth continuity.
- Earth cable destinations shall be labeled appropriately.
- All earth cable above ground must be insulated yellow/green earth.
- Above ground equi-potential bonding to equipment should be painted with high zinc galvanising paint.
- All exposed Yellow/Green PVC earth cables should be enclosed in black conduit to protect from UV/Sun damage.
- Onsite routine Earthing inspection and tests should be performed as part of the maintenance in accordance with the site maintenance plan and ISMP.

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Job Title:

**EUGOWRA SOLAR FARM  
DC DESIGN**

Sheet Title:

HV Electrical Design -  
SF Earthing

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1:1000

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