

	<b>Report</b>	<b>Transmission Telecommunications NPAE</b>
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Title: **Application Design for: BESS** Document Identifier: **240-135101235**  
**Melkhout SS MSAP**

Alternative Reference Number: **PRJ10901**

Area of Applicability: **Eskom Holdings SOC Ltd**

Functional Area: **Eastern cape**

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Date: 24 August 2022	Date: 25/08/2022	Date: 26/08/2022

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## **1. Introduction**

The Battery Energy Storage Systems (BESS) project is aimed at addressing constraints in the power network such as; network strengthening requirements for capacity, ancillary network services and energy support services. The BESS program forms a part of the World Bank funding set of criteria for ESKOM's major build program. Melkhout is part of phase 1 of the BESS program that will be used by national control for Ancillary Services, Energy Support and Load Shaving use cases. The BESS site will be designed to support the local network constraint and provide network services to the System Operator

## **2. Supporting Clauses**

### **2.1 Scope**

The document contains the low-level scope of work (detailed design) and bill of quantities to provide Telecommunications services at Melkhout BESS substation.

#### **2.1.1 Purpose**

This document will be used as a guide for the scope of works for the detail design phase of the Melkhout's BESS project (ERA phase of PLCM).

#### **2.1.2 Applicability**

This document shall apply throughout Eskom Holdings Limited Divisions.

#### **2.1.3 Effective date**

This document shall be effective after the acceptance of TDRT, once all relevant parties have signed.

## **2.2 Normative/Informative References**

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

### **2.2.1 Normative**

- [1] 240-70732272 MSAP Design Guide
- [2] 240-72274839 Multimode Fibre Optic Duct Cable Specification
- [3] 240-132513474 Telecommunications Network Interface Converters Design Guide
- [4] 240-84979963 DC Systems Design Guide for Telecommunications
- [5] 240-118870219 Standby Power Systems Topology and Autonomy for Eskom Sites

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- [6] 240-132513474 Telecommunications Network Interface Converters Design Guide
- [7] 240-56362336 Installation of a Telecoms Equipment Cabinet Standard
- [8] 240-132190480 Telecommunication Equipment Installation Standard
- [9] 240-70732272 MSAP Design Guide
- [10] 240-56362336 Standards for the Installation of a Telecommunications Equipment Cabinet
- [11] 240-56872313 Radio Station Earthing and Bonding.
- [12] 240-46263618 Fibre-optic cables and ODF labelling standard
- [13] 240-67907017 Fibre Optic Core Allocation Standard
- [14] 240-70732902 Fibre Optic Connector
- [15] 240-70732888 Fibre Optic Cable System Acceptance Testing
- [16] 240-70733995 ODF / Patch Panel / Patch Box
- [17] 240-64100247 Standard for Earthing of Secondary Plant Equipment in Substations
- [18] 240-94136376 IP Voice and Data Network Design Guide
- [19] 240-140642648 Fibre Optic design standard – PART 1 Lines and Cables
- [20] 240-64455961 RAD OLTE Design Guideline

### **2.2.2 Informative**

- [1] ISO 9001 Quality Management Systems
- [2] ESP 32-1203 – Eskom Telecommunications User Requirements
- [3] ISO 9001 – Quality Management Systems
- [4] 32-373 – Information Security-IT/OT Remote Access Standard
- [5] ST\_240-55410927 – Cyber Security Standard for Operational Technology

### **2.3 Definitions**

N/A

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## 2.4 Abbreviations

Abbreviation	Explanation
ABB	ASEA Brown Boveri (manufacturer and supplier of the Fox 615 multiplexer)
ATP	Acceptance Test Procedures
BESS	Battery Energy Storage System
BOQ	Bill of Quantities
CSM	Customer Services Manager
DC	Direct Current
DCN	Data Communication Network
DX	Eskom Distribution
EC	Eastern Cape
ECOU	Eastern Cape Operating Unit
ERA	Execution Release Approval
ESKOM	Electricity Supply Commission
HIRA	Hazard Identification Risk Assessment
IT	Information technology
ISO	International Organization for Standardization
IP	Internet Protocol
MCB	Miniature circuit breaker
MSAP	Multiple-services Access Platform
NCC	National Control Centre
NMC	Network Management Centre
NPAE	National Planning and Application Engineering
O&FS	Operations and Field Services
ODF	Optical Distribution Frame
OT	Operational technology
EPC	Engineer, Procure and Construct
PLCM	Project Lifecycle Model
PM	Project Management
QA	Quality assurance
REH	Regional Engineering Head
SAP	Enterprise Resource Planning software
SC/APC	Standard Connector/Angled Polished Connector
SCADA	Supervisory, Control and Data Acquisition
SS	Substation
STABNAC	Standby National Control Centre
TCM	Telecommunications Contracts Manager
TDM	Time division multiplex
TDRT	Telecommunications Design Review Team
URS	User requirements specifications

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## 2.5 Roles and Responsibilities

The designated project engineer shall be responsible to ensure that this design follows technical governance and authorisation. The TDRT committee shall carry the responsibility of ensuring that the proposed telecoms solutions are technically viable, The Telecommunications management must ensure that the recommendations in this report are implemented and the responsibility to implement this document will lies with the project management department.

<b>Role clarification</b>		
<b>Planning and Design</b>	<b>Comments</b>	
Detail design submission to relevant DRTs, (TDRT, Lines DRT, Substation DRT)	EPC	Design, incl. SOW & BOQ signed off by Eskom
Install a duct fibre optic cable (48 core single mode) between Melkhout SS and Melkhout BESS SS control room (ODF to ODF)	EPC	Design, incl. SOW & BOQ signed off by Eskom
DC supply (50V) at Melkhout BESS SS (converter from the 110V supply).	EPC	Design, incl. SOW & BOQ
Transport equipment (as per BOQ)	EPC	Design, incl. SOW & BOQ
Multiplexor equipment (as per BOQ)	EPC	Design, incl. SOW & BOQ
IP/MPLS equipment (as per BOQ)	EPC	Design, incl. SOW & BOQ
Integration to existing ET network	ET	Design, incl. SOW & BOQ
Standards and design guides documentation	ET	Electronic copies of applicable standards
<b>Implementation</b>		
Network circuit connections	ET	
Commissioning with NMC	ET	
QA (pre-commissioning)	ET & EPC	
Provide signed-off equipment ATPs for all equipment installations (cold commissioning results)	EPC	
As built documentation and drawings of the station	EPC	
Procure equipment as per ET BOQs (OLTEs, Multiplexor equipment, routers)	EPC	
Installation of ET equipment within panels (OLTEs, Multiplexor equipment, routers)	EPC	
Control room reticulation/wiring (for telephones, security, and IT)	EPC	
SHEQS	EPC	
Optic fibre Testing	EPC	
Witness fibre testing with EPC contractor	ET	
Procure the Cisco licence for the IP phone, register under the ESKOM Smart Licence account) and submit the order number to ESKOM PM.	EPC	Liaise with NMC to keep the licence.

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### 2.5.1 Stakeholder table and contact details

<b>Responsibility</b>	<b>Name</b>	<b>Cell-phone number</b>	<b>Office number</b>
Project Engineer	Nolufefe Ngalonkulu	083 940 4010	021 980 3288
NMC	Wicus Aswegen	082 410 6773	047 502 6445
Project Implementation	Siyakudumisa Nondula	082 410 6773	043 703 2607
O&FS	A-J Phillips	072 384 6047	041 996 5311
BESS Design	Thomas Jacobs	082 562 3973	021 980 3578
EC REH	Chris Scarr	082 925 6367	041 404 3325
DX CSM	Nolan Dominick	083 793 8716	021 980 3486
EC SCADA/TCM	Les Fenn	083 399 4870	043 703 5009
Sunilaws SCADA	Vaughn Emslie	083 456 5024	043 703 5100
NCC/STABNAC SCADA	Kabelo Lebotsa	082 511 0522	011 871 2732

### 2.6 Process for Monitoring

Project Management shall monitor and manage the implementation of the design to completion.

### 2.7 Related/Supporting Documents

ETFM 1846 ET Project Planning Book Rev 1

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**3. BESS Melkhout SS MSAP**

**3.1 Telecomms Service Application Form.**

This detailed design is in response to the user requirements specifications (URS) that was submitted by Distribution ECOU, for the design of the Telecommunications requirements for Melkhout BESS Substation. The new Melkhout BESS Substation will connect to Melkhout Substation.

<b>Eskom - Telecommunications Division</b>							
<b>Service Application Form</b>							
						<b>Ref</b>	240-120317983
						<b>Rev</b>	2
<b>Customer Details</b>							
<b>Customer:</b>		Distribution ECOU					
<b>Company &amp; Division</b>		Eskom Distribution					
<b>Customer Representative:</b>		Les Fenn					
<b>Customer Telephone:</b>		043-7035009					
<b>Customer Facsimile:</b>		865388605					
<b>Customer Email Address:</b>		fennl@eskom.co.za					
<b>Customer Business Address:</b>		Eskom Distribution ECOU; Sunilaws Office Park; C/O Bonza Bay Rd & Quenera Drive; Beacon Bay; 5241					
<b>Customer Project Details</b>							
<b>Customer Project Name:</b>		Melkhout BESS Project					
<b>Customer Project Number:</b>							
<b>Customer Reference Number:</b>							
<b>Preliminary Completion Date Request:</b>							
<b>Locations</b>							
A	<b>Building, Floor, Room no</b>		Sunilaws Control Centre				
	<b>Physical Address</b>						
	<b>Site Co-ordinates</b>		<b>Latitude:</b>	31 26 59.7	<b>Longitude</b>	26 23 21.08	
	<b>Building, Floor, Room no</b>		Melkhout S/S BESS				
B	<b>Physical Address</b>						
	<b>Site Co-ordinates</b>		<b>Latitude:</b>	34° 0'1.00"S	<b>Longitude</b>	24°46'59.66"	
C	<b>Building, Floor, Room no</b>		Unsure Where the security will be monitored from				
	<b>Physical Address</b>						
	<b>Site Co-ordinates</b>		<b>Latitude:</b>		<b>Longitude</b>		
	<b>Building, Floor, Room no</b>						
D	<b>Physical Address</b>						
	<b>Site Co-ordinates</b>		<b>Latitude:</b>		<b>Longitude</b>		
E	<b>Building, Floor, Room no</b>						
	<b>Physical Address</b>						
		<b>Site Co-ordinates</b>		<b>Latitude:</b>		<b>Longitude</b>	
<b>Service Requirements</b>							
<b>1. Telephone (PAX circuit)</b>							
		<b>Quantity</b>					
<b>Business Voice</b>		1					
1 x IP extension to Melkhout BESS Site from the closest exchange							
<b>2. Data circuits</b>							
<b>Premium Point to Point</b>							
Description of circuit		Division	Speed	Service Level	Site From	Site to	Interface
1	X21 RTU Circuit - Sunilaws Operations Centre (SOC) to Melkhout BESS (RTU)	DX	64k	Silver	A	B	X21
2	<del>IP EDNET (Remote Engineering Access) - Sunilaws Operations Centre (SOC) to Melkhout BESS</del>	<del>DX</del>	<del>IP: 2Mb/s</del>	<del>Silver</del>	<del>A</del>	<del>B</del>	No Longer required circuit already available at Melkhout S/S <del>IP</del>
3	CCTV, Alarm systems- Melkhout BESS - ????? (Unsure Where the security will be monitored from) To Be Advised if centralised Security Control room/Manned Site/3rd party Security	DX	IP: 10Mb/s	Silver	B		IP
4	Melkhout BESS (National)	TX	9.6kbps	Silver	A	C	X.21

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5	Melkhout BESS (STABNAC)	TX	9.6kbps	Silver	A	D	X.21
6	Melkhout PMU	TX	128kbps	Silver	A	C	Ethernet
7							
8							

Operational Voice							
	Description of circuit	Division	Speed	Service Level	Site From	Site to	Interface
1							
2							
3							
4							
5							

Miscellaneous Requirements	
1	Equipment will be provided by the BESS and Eskom Telecomms to witness all testing and do the commissioning
2	New MSAP to be installed at BESS site. (See point '6 Other Information' below)
3	
4	
5	
6	

**Information required by Eskom Telecommunications**

To provide the customer with a complete and proper solution the following information is required:

- Site Location - A diagram showing the location of the site or suitable point form directions to the site.
  - Site Layout - A diagram indicating the layout of the site. Diagrams for all areas owned by the customer at the site should be provided. The diagram(s) should mark areas where the customer expects to install future equipment.
  - Room Layout - A diagram indicating the layout of the equipment room. The diagram(s) should mark areas where the customer expects to install future equipment.
  - Facilities, including 220V AC & 50V DC - At customer premises, the customer shall provide AC and/or DC as required by Eskom Telecommunications. Secure floor and/or wall space may be required, including air-conditioning, anti-static carpet, racking, trunking, etc. Customer to advise of current conditions and facilities available for the installation.
  - Contact Personnel - The customer should provide the contact details of ALL their personnel which Eskom Telecommunications will require to contact in order to provide a full solution. Examples of relevant people Eskom Telecommunications will need to contact are: Person responsible for access to site, Person responsible for expansion of site, Possibly Person responsible for current project occurring at the site etc.
- |                         |                  |              |               |               |             |
|-------------------------|------------------|--------------|---------------|---------------|-------------|
| i. Name:                | Les Fenn         | Designation: | Scada Manager | Telephone No: | 043-7035009 |
| Area of Responsibility: | Scada Management |              |               | Facsimile No: |             |
| ii. Name:               |                  | Designation: |               | Telephone No: |             |
| Area of Responsibility: |                  |              |               | Facsimile No: |             |
| iii. Name:              |                  | Designation: |               | Telephone No: |             |
| Area of Responsibility: |                  |              |               | Facsimile No: |             |
| iv. Name:               |                  | Designation: |               | Telephone No: |             |
| Area of Responsibility: |                  |              |               | Facsimile No: |             |
| v. Name:                |                  | Designation: |               | Telephone No: |             |
| Area of Responsibility: |                  |              |               | Facsimile No: |             |

- Other - Other information that the customer believes will aid Eskom Telecommunications in offering a proper solution.
  - New MSAP to be installed at BESS site. Melkhout S/S MSAP will be a single point of failure if it is used as for the BESS site as well this is a risk.
  - 
  - 
  - 
  -

**Sign-off**

Responsible KAM:	DX: Nolan Dominick; Tel: 021 980 3486; Email: nolan.dominick@eskom.co.za		
Customer Signature:	Les Fenn	Application Date:	24th May 2022
Responsible KAM:	 Digitally signed by Nolan Dominick DN: cn=Nolan Dominick, o=Eskom, ou=Transmission, email=nolan.dominick@eskom.co.za, c=US Date: 2022.07.07 08:38:40 +0200		
Customer Signature:		Application Date:	

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### **3.2 Financial**

The financial investment required for the complete design was calculated using the BESS Melkhout SS MSAP\_240-139189078 Project Supporting Templates Rev 1.xlxs. Refer to the business case for full labour costing and equipment costing (BOQ), based on Eskom contractual rates.

### **3.3 Detail Design**

#### **3.3.1 General**

- ❖ Ensure compliance to all standards, specifications and procedures listed in this document.
- ❖ Refer to the equipment supplier documentation for product specific setup, installation, and commissioning details.
- ❖ Ensure all equipment is pre-commissioned and tested prior to installation on site.
- ❖ The scope of work details will not necessarily be listed in sequence of implementation.
- ❖ Label all telecommunication equipment, DC circuit breakers, cables and Krone Blocks correctly at both ends.
- ❖ Update equipment details of the sites on WORKPLACE and ASSET REGISTER on SAP.
- ❖ On project completion, ensure that all changes in this Project Documentation are RED lined and returned to PM to update the as-build documents.
- ❖ The work as detailed in this SOW will be considered completed once the project's Completion Certificate is signed.
- ❖ The Quality Assurance person reserves the right to instruct a job to be re-done if he feels that the quality of workmanship is of an unsatisfactory nature or that there was a total disregard of standards.
- ❖ Ensure a separation of the patch panels (single mode for the telecommunications equipment and multimode for the Transmission equipment)

#### **3.3.2 Design philosophy**

The design meets the standards listed below:

- ❖ 240-70732272-MSAP Design Guide.
- ❖ 240-94136376 IP Voice and Data Network Design Guide
- ❖ 240-118870219 Standby Power Systems Topology and Autonomy for Eskom Sites
- ❖ 240-64455961 RAD OLTE Design Guideline

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This design is based upon the following:

The EPC contractor will install a 48 core single mode fibre duct cable between Melkhout BESS SS and Melkhout SS. This fibre cable will be terminated ODF-ODF at both stations inside the telecommunications cabinet. Since this project is a turnkey/EPC, the EPC contractor will supply and install all equipment and panels required to conclude this project.

The telecommunications equipment is supplied by a 50V DC. A suitable DC isolating convertor (110v/50v@20A) will be required at the BESS site. The DC current drawn by the telecommunications equipment at Melkhout BESS SS has been calculated to supply the Telecommunications Cabinet (MSAP + Router + OLTE) as:

<b>Load Calculation</b>		
<b>Total Current drawn by Equipment (incl Growth factor)</b>	<b>4.16</b>	<b>A</b>
<b>ampère-hour Load per Day</b>	<b>99.8</b>	<b>Ah</b>

The OLTE installation at Melkhout SS will have minimal impact on the current DC system, the system draws 0.15A DC.

### 3.3.3 Transmission design (Path budget)

<b>Optic Fibre Budget Calculator</b>			
<b>Route:-</b>	<b>Melkhout SS - Melkhout BESS</b>		
<b>Item</b>		<b>Units</b>	<b>Notes</b>
<b>Optic Parameters</b>	1310nm	nM	Use Drop down box to select Wavelength
<b>Loss/km</b>	0.4	db	Gives loss/Km for this wavelength
<b>Transmitter Power</b>	-12	dbm	LED or Laser power output
<b>Module name</b>	Laser		Long haul laser 1310
<b>Length</b>	1	Km	Distance between terminal equipment
<b>No. of splices</b>	5	ea	0.1db loss per splice
<b>Connectors</b>	4	ea	0.5db loss per connector (Allow for Patch panel)
<b>Repair Margin</b>	10	ea	No. of repairs/extra splices (Typically 1 per 2Kms)
<b>Equip Margin</b>	3	db	Normally 3db
<b>Rx Sensitivity</b>	-28	dbm	Threshold for the Rx
<b>Rx I/P</b>	-18.9	dbm	Equals Tx Power Minus Losses of Line, Splice, Connectors, Repair Margin & Equipment
<b>Link Budget</b>	9.1	dbm	Available signal above Receiver threshold cutoff
<b>Feasibility</b>	Yes		Yes or No
<b>Colour Code</b>		Wavelength being used	
		Enter Your Figures for the System	
		Budget Results	
		Go or No Go	

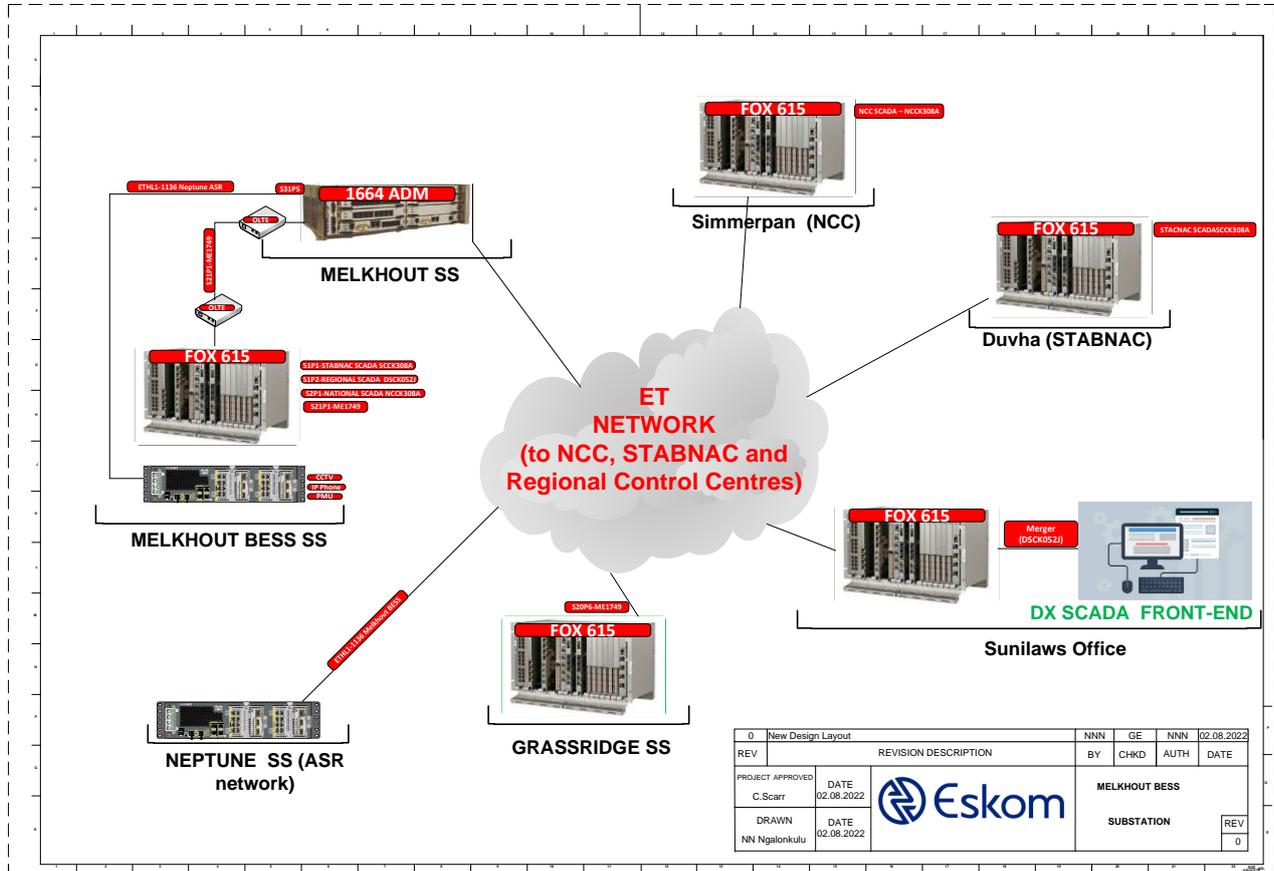
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Figure 1 High Level Design

The high level design for the complete project is depicted in the drawing below, indicating the network interconnections and the equipment that will be deployed at each site.



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NMC Works Order (Tsv56163)

The NMC task order with the list of circuits and links is listed in the table below.

**NMC New Services Configuration Work Order**  
(Only fill in the yellow blocks. Some blocks have pull down lists to make selection easier)

Template: D00946/4

General Information			
Task Number:	TSV56163	Required Completion Date:	May-23
Project Description:	Installation of Telecommunications equipment at Melkhout BESS Substation		Project Number: PRJ10901

NEW Circuit Configuration Data										
Circuit Number	SLA	Crt Speed	Site A Name	WorkPlace PlantID	Port	Interface	Site B Name	WorkPlace PlantID	Port	Interface
DSCCK052J	Silver	64k	Melkhout BESS	Melkh-SS02	S1P2	X21	Sunilaws	Sunil-OF01	DSCCK052	Merger
NCCCK308A	Silver	9k6	Melkhout BESS	Melkh-SS02	S1P1	X21	Simmerpan Dec	Simme-OF12	S19P2	X21
SCCK308A	Silver	9k6	Melkhout BESS	Melkh-SS02	S2P1	X21	Duvha	Duvha-PS06	S19P2	X21
ETHL1-0931	Silver	10M	Melkhout BESS	Melkh-SS02		Ethernet	VRF			Ethernet
Melkhout BESS PMU	Silver	128k	Melkhout BESS	Melkh-SS02		Ethernet	VRF			Ethernet
Melkhout BESS IP Phone	Silver	64k	Melkhout BESS	Melkh-SS03		Ethernet	VRF			Ethernet

NEW Node Configuration Data								
MSAP Hangs off Site Name	WorkPlace PlantID	New Node Site Name	WorkPlace PlantID	NodeType	Short Code	Node Number	Domain	
Grassridge 132	Grass-SS01	Melkhout BESS Substation	Melkh-SS02					

NEW Link Configuration Data										
Region	Site A Name	WorkPlace PlantID	Site B Name	WorkPlace PlantID	Link Type	Ownership	End Point			
PEA - Port Elizaeth Access	Melkhout BESS	Melkh-SS02	Grassridge	Grass-SS01	PDH	Distribution				
(Region is as per Morning Report categories)					Billable	Link No	Capacity	SDH End Point		
					External SDH Payload Positions					

Scope of Work		Time
Commission the Fox 615 at Melkhout BESS SS (S21P1). Configure the 1*E1 link to Grassridge SS (S20P6). The S1 link will be a DCN/Traffic split.		
Configure the point to point SCADA circuit for National Control (NCCCK308A).		
Configure the point to point SCADA circuit for Standby Control (SCCK308A).		
Configure the point to point SCADA circuit for Regional Control circuit (DSCCK052J). This will be part of a merger group.		
Configure and commission the CGR router at Melkhout BESS SS (Melkhout ADM S31P5), working off the Neptune ASR router on port G0/1/4 (Neptune ADM S15P5).		
Configure the link at 12Mbps capacity. Circuit number ETHL1-1136.		
Configure the ethernet of the CGR router for the following services and on their respective VRFs: PMU, IP Phone, CCTV/Security.		

**Allocated IP Addresses**

The numbers allocated will be available for Telecommunications personnel who will assist with the commissioning.

- ❖ IP address for the PMU at Melkhout BESS
- ❖ IP address for the CCTV IP address for Melkhout BESS
- ❖ Router IP address at Melkhout BESS
- ❖ IP Phone allocated number: 8710 4230

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## MELKHOUT BESS SS

The installation of the telecommunications equipment inside the control rooms will be done as per the standards:

- ❖ The cabinet shall be wired and installed as per 240-56362336 Standards for the Installation of a Telecommunications Equipment Cabinet.
- ❖ Site installation will be based on technology standard 240-132190480 Telecommunication Equipment Installation Standard.
- ❖ Earthing of the telecommunications equipment, shall be done according to the Technology specification 240-56872313 - Radio Station Earthing and Bonding.
- ❖ The fibre-optic cables and ODF labelling standard 240-46263618
- ❖ 240-67907017 Fibre Optic Core Allocation Standard
- ❖ 240-70732902 - Fibre Optic Connector

Install the 48U cabinet, on the location indicated in the control room layout drawing from the Distribution (Dx).

Populate with OLTE, CGR 2010 router, Fox 615 multiplexor, X21 distribution panel, 48 core patch fibre patch panels and TJF. Refer to the cabinet layout drawings for the face plan of the panels.

Run DC cable 2 core 6mm, between the 50V converter and the comms cabinet. Terminate on the DC MCB.

Provide earthing from the station earth to the cabinet.

## FIBRE OPTIC CABLE

Terminate the 48 core single mode duct fibre cable on the patch panel in the fibre cabinet (direction Melkhout SS).

Terminate the 24 core multimode mode duct fibre cable on the patch panel in the fibre cabinet (to the PMU cabinet).

Label the fibre cables and patch panels as stipulated in the labelling standard.

The fibre-optic cable must be glanded on the outer sheath using a compression gland where it enters the 19" cabinet. At least 5 m of slack must be left inside the cabinet for splicing.

Testing the fibre ODF-ODF and recording the test results based on 240-70732888.

ET (fibre team) will be available to witness the testing of the fibre optic duct cable. Dx to handover the fibre optic test results to telecommunications team.

Patch the OLTE link to the fibre patch panel on core ½ using the provided SC-SC/APC patch cable.

Patch the router to the fibre patch panel on core ¾ using the provided SC-SC/APC patch cable.

Patch the fibre pair between the MM patch panel to the CGR router, using the 100M SFP.

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#### FOX 615

Run a 2 core DC cable, 2.5mm, from the circuit breaker to power up the Fox multiplexor. Populate the Fox 615 multiplexor with the modules, as per the Fox cabinet card layout drawing.

Wire out the LEDS module in the distribution panel and terminate on X21 panels.

Install the X21 protection panel.

Commission the E1 links and circuits for services. Prepare for the routing of the circuits.

Earth the Fox to cabinet earth.

Complete the QA as per 240-110412152 - Generic QA tick sheet for projects for this installation.

Record the MSAP ABB ATPs for the installation.

#### CGR 2010

Run a 2 core DC cable, 2.5mm, from the circuit breaker to power up the CGR 2010.

Earth the router to cabinet earth.

Refer to Figure 2, for the full connectivity, IP addresses and circuit connections to

Complete the QA as per 240-110412152 - Generic QA tick sheet for projects for this installation.

#### MELKHOUT SS

Populate the cabinet with OLTE and 48 core patch fibre patch panels and TJF. Refer to the cabinet layout drawings for the face plan of the panels.

Run DC cable 2 core 6mm, between the 50V converter and the comms cabinet. Terminate on the DC MCB.

Patch the OLTE link to the fibre patch panel on core ½ using the provided SC-SC/APC patch cable.

Patch the ADM's ethernet port S31P5 to the fibre patch panel on core ¾ using the provided SC-SC/APC patch cable.

Patch the E1 from the OLTE's TRIB 1 to the ADM.

#### GRASSRIDGE SS

Configure the MSAP E1 on S20P6, for Traffic/DCN.

Patch the E1 from the ADM to the MSAP E1 S20P6 port.

#### SUNILAWS

Configure and test the merger SCADA circuits, DSCK052J. Refer to the NMC works order sheet (table 2).

Configure and test the IP phone.

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#### NATIONAL CONTROL

Configure and test the SCADA circuits (NCKK308A), DEC Room 6 S19P2.

#### STANDBY CONTROL

Configure and test the SCADA circuits (SCCK308A), A-S19P2.

### **3.4 Contractual**

The equipment will be procured by the contractor (EPC process).

### **3.5 Safety**

The normal practice as set out in the ET HIRA shall be abided by. Eastern Cape O&FS will do the QA of the installation, and commissioning of circuits. The installation of equipment will be done by the contractor – because the full project is a turnkey/EPC.

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**3.6 Procurement**

The equipment required for this project will be procured by the EPC contractor. The BOQ listed below is an indication of what items to be purchased. All installation material and quantities need be confirmed by the installer prior to installation on site. **NB.:Procure the Cisco licence for the IP phone, register with CISCO under the ESKOM Smart Licence account) and submit the order number to ESKOM PM.**

BILL OF QUANTITIES (BOQ)																
Name		BESS Melkhout SS MSAP										Number				
Equipment Delivery Address		Nitheen Keshav										Number of Sites		6		
Item No.	Bill of Materials for Telecommunications (Standard Design, Contract Items)	SAP Line Number	Material Number	Asset Class	Unit	Unit Price	Melkhout BESS	Melkhout SS	Grassridge SS	Sumitlows	NCC	Stabnac			Total Qty	Total Price
Description (enter contract number first, then enter descriptions)																
1	460064029 - MPLS: FOX 615															
2	SHELF ASSY,ELCTR:ABBMSAP-6U;FOX;FFT	Line 110	253458	3	ea		1								1	
3	SOFTWARE:ABB-MSAP-LIC;FOX	Line 70	253454	3	ea		1								1	
4	MODULE,COMMS:ABB-MSAP-UNIDA;FOX (X21)	Line 140	253463	3	ea		2								2	
5	MODULE,COMMS:ABB-MSAP-CPU;PROCESSOR	Line 380	569429	3	ea		1								1	
6	MODULE,COMMS:ABB-MSAP-E18;FOX	Line 160	253469	3	ea		1								1	
7																
8	4600071130-WIRCONN															
9	CABINET:COMPLETE A-48U;WD 600 MM;600 MM	Line 180	579563	1	ea		1								1	
10																
11	460062264 - COM 10 DIVISION OF ACTOM															
12	MODULE:O; DISTRIBUTION;I/P 50 VDC	Line 2130	662291	21	ea		1								1	
13	Isolating DC-DC Converter, 110V DC/48V@20A	Line 300	636758	21	ea		1								1	
14																
15	460068823 - NEXIO															
16	License: A-FLEX-P-ENH	2310	300031590	7	ea		1								1	
17	Cisco UC Phone 7821 CP-7821-K9=	Line 1010	690733	7	ea		1								1	
18																
19	OLTE															
20	OP-108/B/R/ETH/SC/13L		240746	8	ea		1	1							2	
21																
22	460069611 - WORLD TELECOM AND DATA (Installation materials)															
23	LEAD, PATCH:LG 2 M;9/125;SC-SC/APC;9 U	Line 270	254108	8	ea		2	2							4	
24	Empty rack with copper earth bar for 19 inch 16 port X.21 DB15 surge protector	Line 2180	229690	8	ea		1								1	
25	Single module for 16 port X.21 DB15 surge protector	Line 2170	697237	8	ea		10								10	
26	19 inch stainless steel back mount frame	Line 2840	678945	8	ea		2								2	
27	10 pair disconnect module, PKT10	Line 1790	250055	8	ea		2								2	
28	Data brush panel IU Color grey 19 inch	No line	No Material Number	8	ea		1								1	
29	Prysmian Single Mode 48 core patch panel SC/APC	No Line	No Material Number	8	ea		2								2	
30	HOLDER:HINGED LABEL:WD 19.6 X LG 110 MM	Line 1810	678579	8	ea		10								10	
31	TRAY:RACK MOUNT:WD 19 IN X 1U:STEEL	Line 2870	678944	8	ea		1								1	
32	CABLE FBR OPTC:HDD;48;9 U;DOUBLE:9/125 U	Line 980	678516	8	ea		1000								1000	
33	LEAD, PATCH:LG 1 M;50/125;(2) SC/APC	Line 680	678370	8	ea		2								2	
34	Prysmian Multimode Mode 24 core patch panel						2								2	
35																
36	4600072214 - CISCO TECHNOLOGY AND SERVICES															
37	Cisco CGR2010 security bundle w/SEC license PAK		603218	17	ea		1								1	
38	EtherSwitch 8x 10/100T (4 PoE) ports + 2 100/1000 SFP		552925	17	ea		1								1	
39	DC (24/48VDC) Power Supply for CGR2010/CGS2520		552924	17	ea		2								2	
40	Data License for Cisco CGR2010		618164	17	ea		1								1	
41	Security License for Cisco CGR2010		690733	17	ea		1								1	
42	Rugged SFP GLC-FE-100FX-RG		617363	17	ea		2								2	
43	1000BASE-LX/LH SFP transceiver module, SMF, 1310nm		602786	17	ea		4								4	

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### 3.7 Completion

All check sheets and commissioning documentation should be filled in prior to QA inspection.

The Generic QA sheet will be used as guidance for quality installation.

All check sheets, including equipment ATPs and QA documents to be handed to the Project Manager on Completion. This as-built documentation will be shared with telecomms to keep.

Hand-over approval certificate should be completed as per 240-139189078.

### 4. Acceptance

This document has been seen and accepted by TDRT workgroup participants:

<b>Name</b>	<b>Designation</b>
Chris Scarr	TDRT Workgroup Chairman
Fefe Ngalonkulu	Project Planner
Jacques Van Der Heide	Project Planner
Mark Isenberg	Project Planner
Paulinus Kortje	Operations and Field Manager
Siyakudumisa Nondula	Project Implementation
Dallas Dreyer	Plant Supervisor

### 5. Revisions

<b>Date</b>	<b>Rev.</b>	<b>Compiler</b>	<b>Remarks</b>
August 2022	2	NN Ngalonkulu	Update the document with TDRT comments
August 2022	1	NN Ngalonkulu	First compilation.

### 6. Development Team

The following people were involved in the development of this document:

- NN Ngalonkulu

### 7. Acknowledgements

N/A.

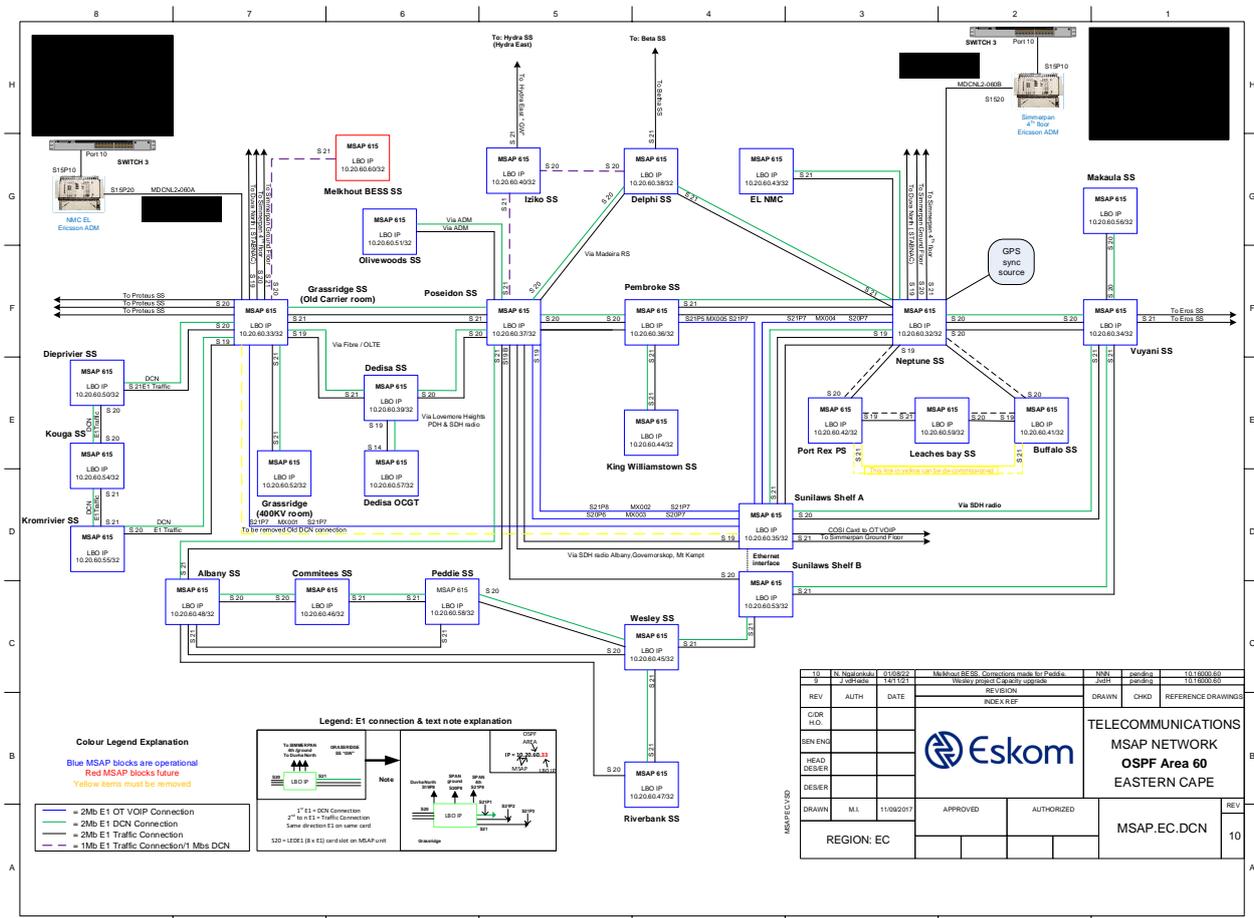
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**Appendix A – Eskom Document Hierarchy**

**A.1 MSAP area 60 DCN**



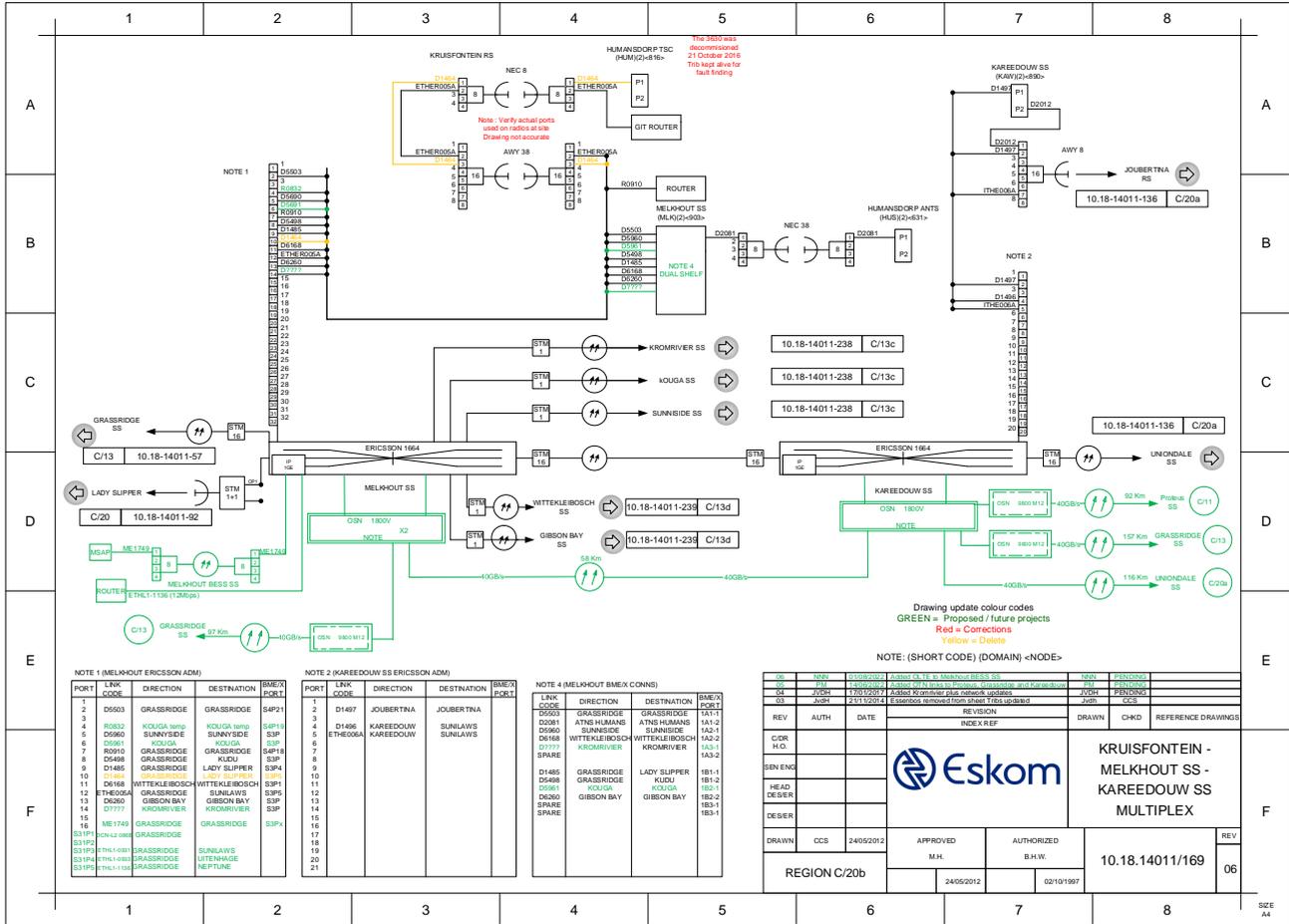
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**A.3 Kruisfontein-Melkhout-Kareedouw SS Mux Diagram**

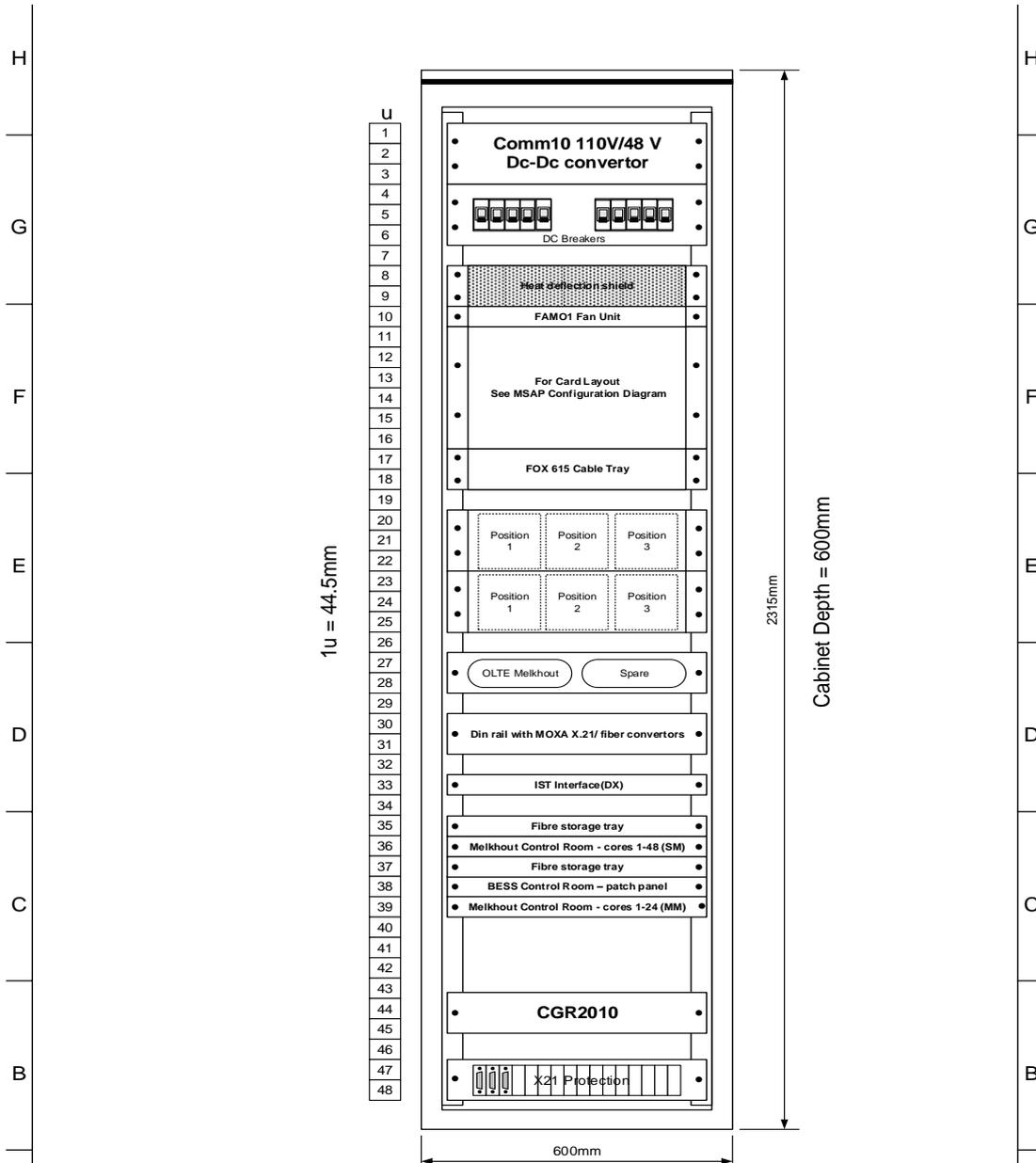


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**A.4 Melkhout BESS SS Cabinet layout**



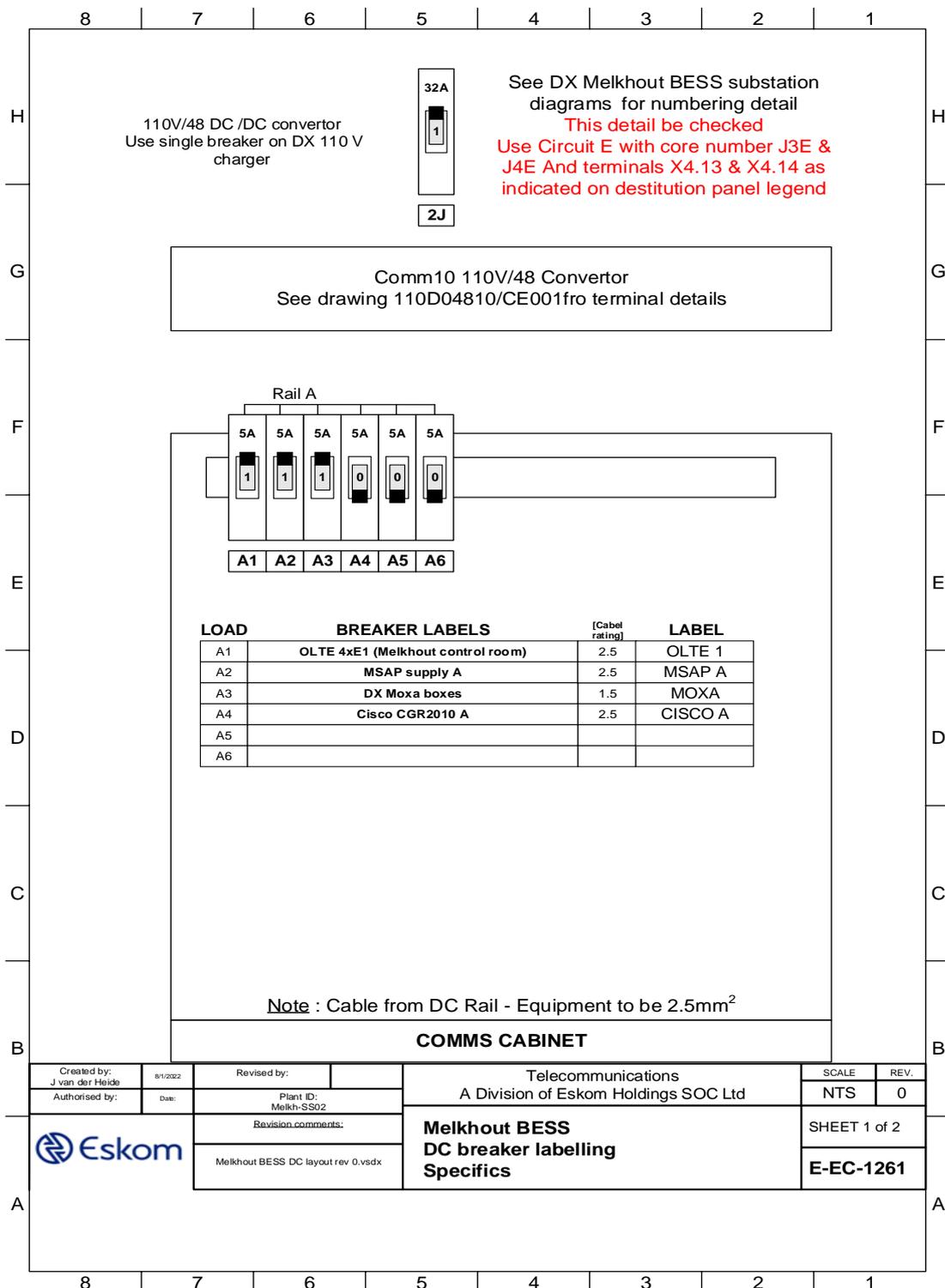
Created by: J van der Heide		8/23/2012		Revised by:		Telecommunications A Division of Eskom Holdings SOC Ltd		SCALE NTS	REV. 0
Authorised by:		Date:		Plant ID: Melkh-SS02		Melkhout BESS Cabinet layout		SHEET 1 of 1	
Revision comments:		Melkhout BESS Cabinet rev 0.vsd						E-EC-1259	

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**A.5 Melkhout BESS DC layout 1**

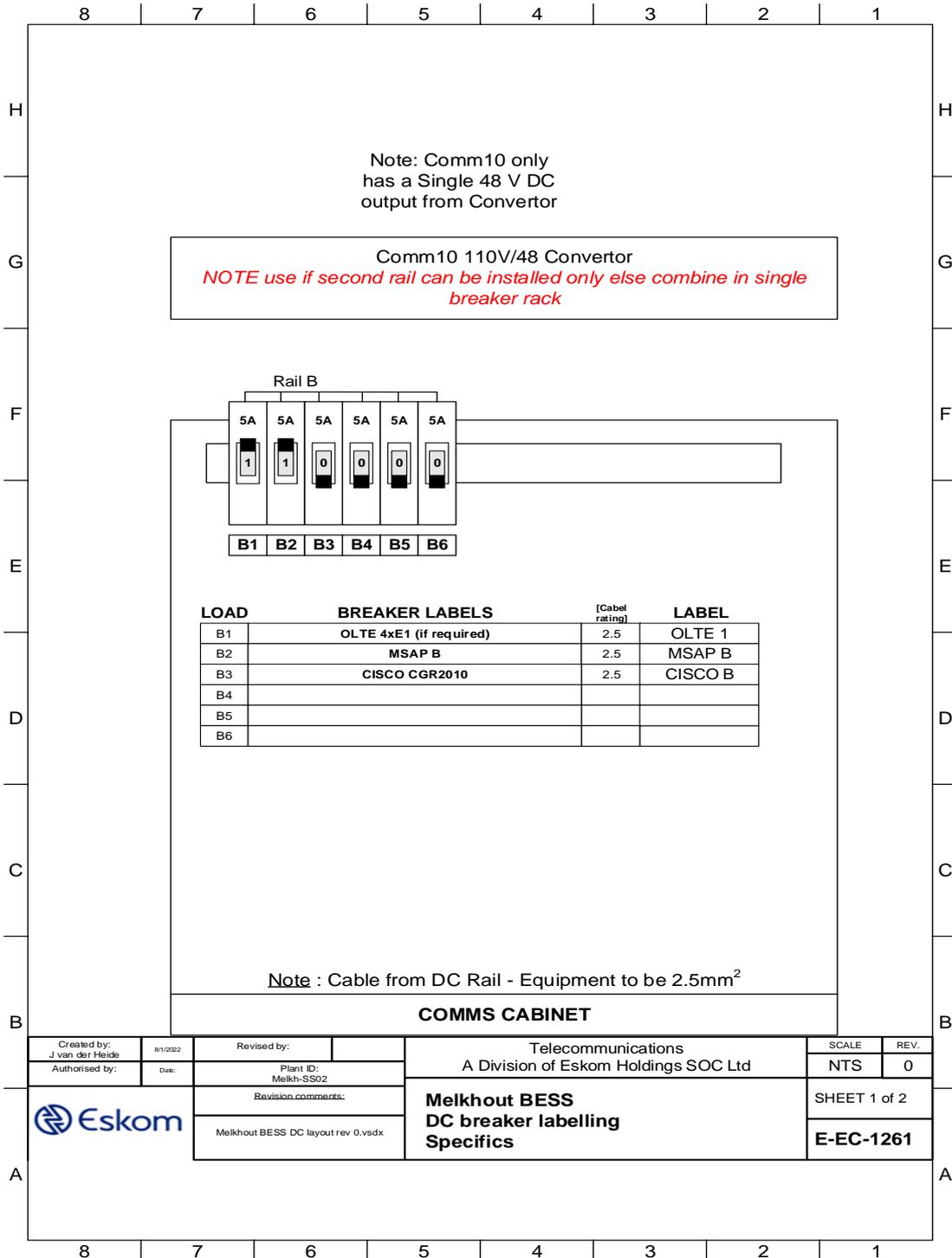


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**A.6 Melkhout BESS DC layout 2**

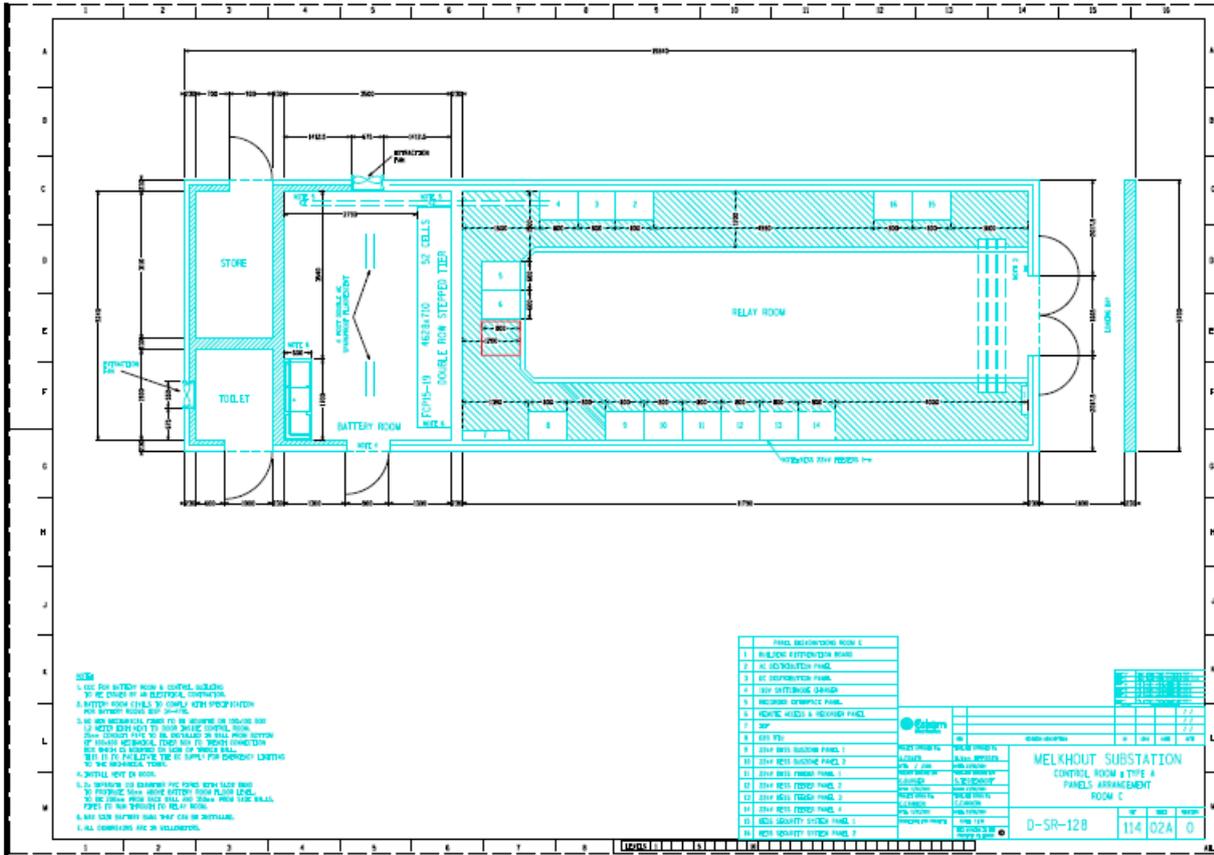


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**A.7 Melkhout BESS Control room layout**

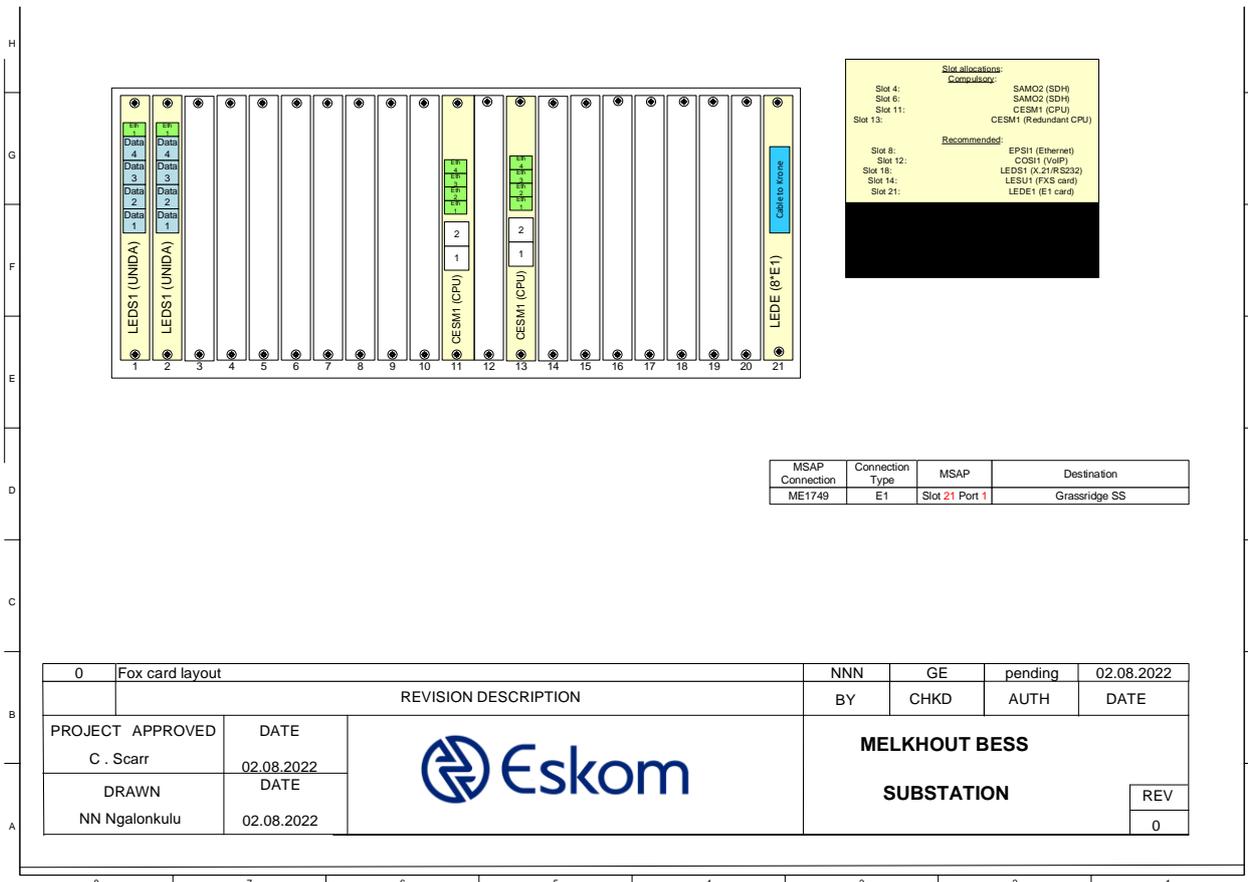


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**A.8 Melkhout BESS FOX 615 card layout**

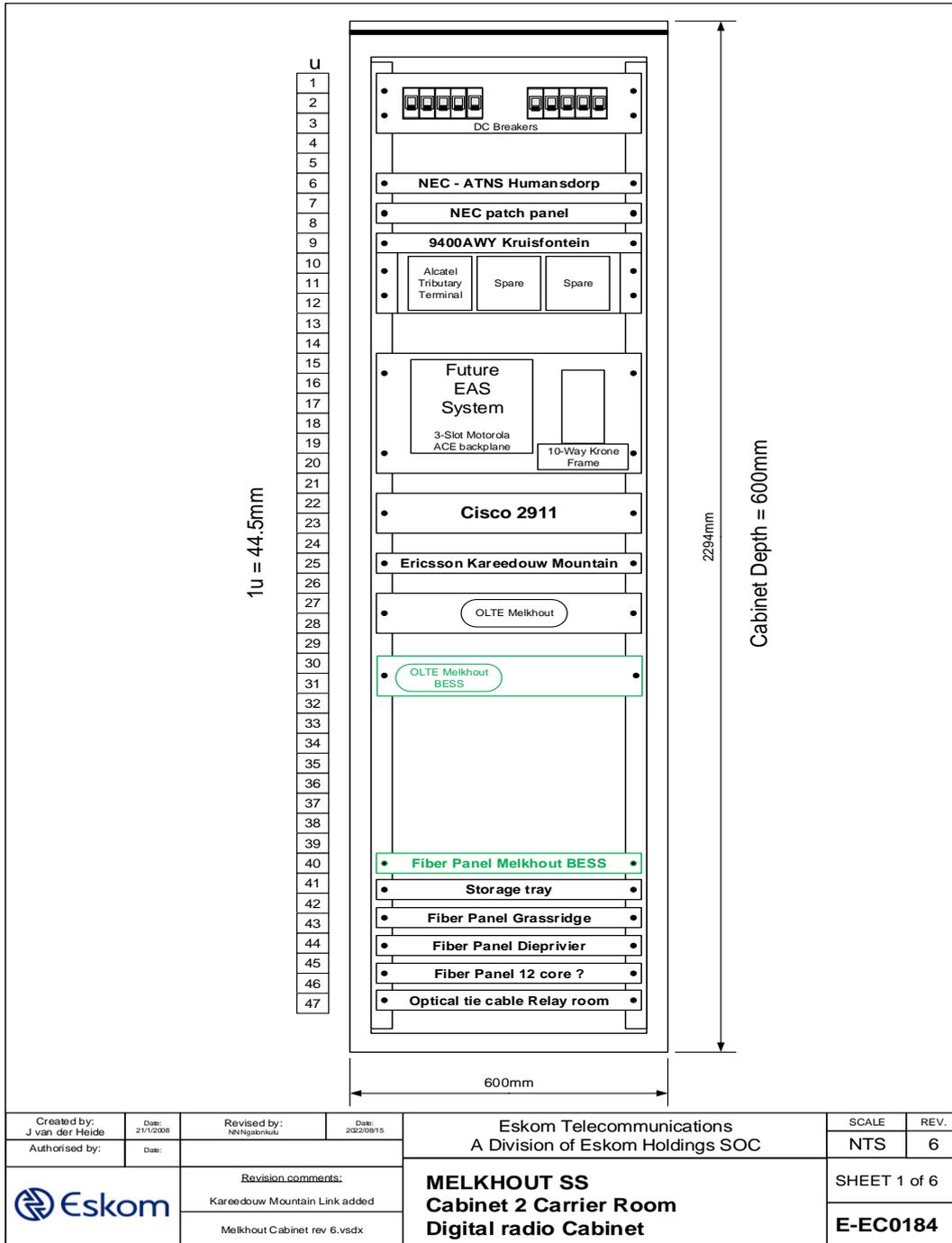


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**A.9 Melkhout SS cabinet layout**

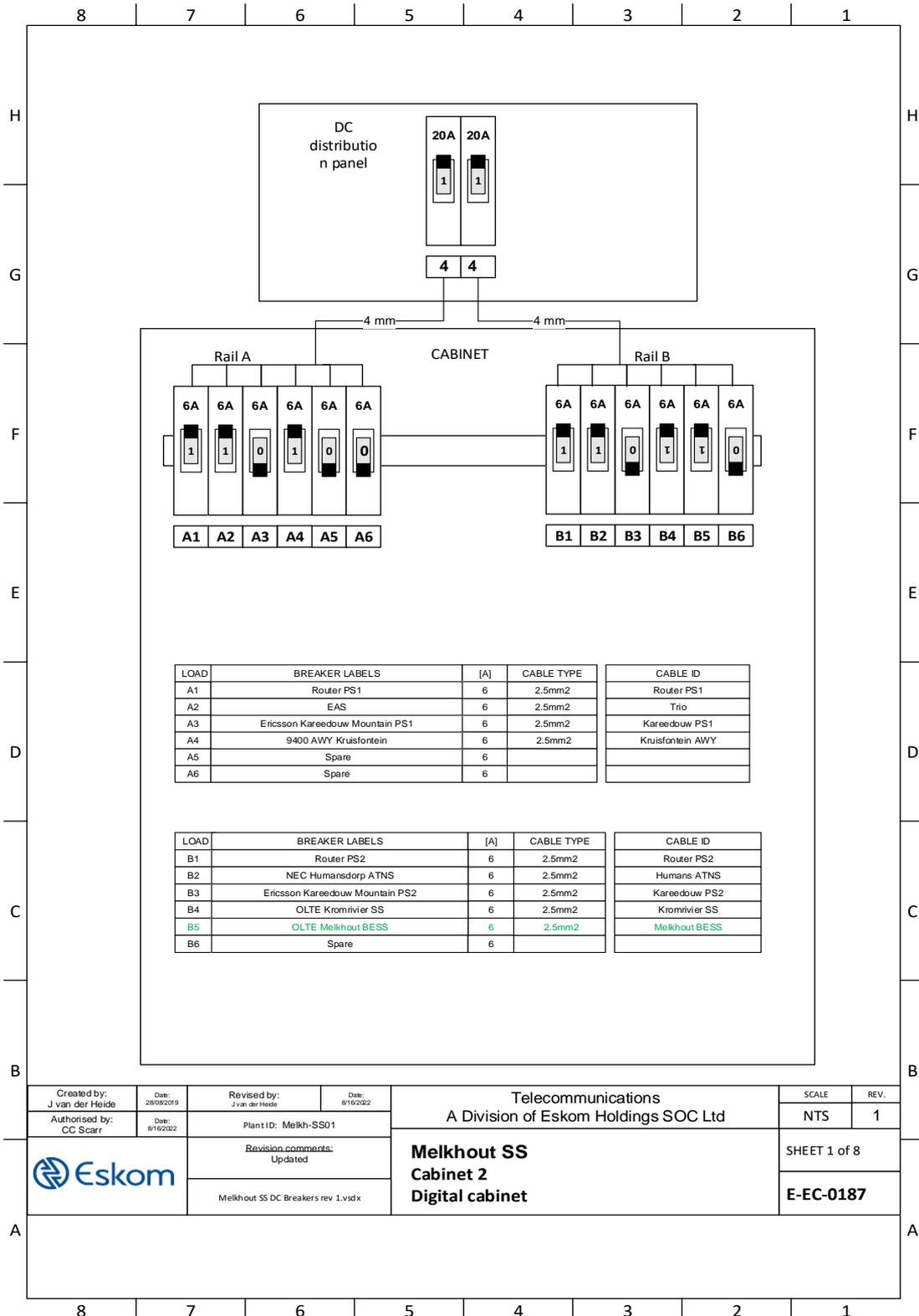


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**A.10 Melkhout SS DC Breakers layout**



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