Eskom National Transmission Company South Africa ™	Scope of Work	NTCSA

Title: **Scope of work for Britskop RS and Uitvalskop RS Battery replacement**

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Compiled by	Supported by	Authorized by
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1. Introduction

The existing Lead Acid batteries installed at Britskop RS (radio site) and Uitvalskop RS are deteriorating at a rapid rate due to increased cycling rate caused by loadshedding. A project has been initiated to replace these batteries before they fail. Telecoms in conjunction with PTM&C DC Technology and Support intend to replace the batteries with a new technology in the form of Lithium batteries that can handle frequent cycling. The two sites will be used as pilot or test sites of this technology in National Transmission Company South Africa (NTCSA), with the aim of rolling it out at all sites that have batteries that are negatively affected by frequent cycling. Britskop RS and Uitvalskop RS are critical to the Telecoms backbone network in the North West region. This document outlines the site-specific DC requirements to enable the supplier/s to respond to the Request for Proposal (RFP) for the design, manufacture at works, testing, quality assurance, delivery to site, off-loading, installation, commissioning, development of training material and provision of training for Lithium-ion Phosphate Batteries for Britskop RS and Uitvalskop RS.

Suppliers to submit proposals on stationary lithium Ion phosphate batteries, accessories, and ancillary equipment as per the standard **240-170000103**.

2. Supporting Clauses

2.1 Scope

2.1.1 Purpose

This document outlines the site-specific DC requirement for Britskop RS and Uitvalskop RS, to guide supplier/s when responding to the request for proposal to ensure that proposed solution meets loading profile and standby time for each site.

2.1.2 Applicability

This document shall apply throughout NTCSA.

2.1.3 Effective date

This document shall be effective once all parties have signed the document.

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] ISO 9001 Quality Management Systems

[2] 240-17000103: Lithium Ion Phosphate Batteries Standard

[3] 240-17000103 -1: Lithium Ion Phosphate Batteries Standard Excel spreadsheet A and B schedules.

[4] 240-171000404: Lithium Phosphate Batteries Tender Technical Evaluation Criteria

2.2.2 Informative

None

2.3 Definitions

None

2.4 Abbreviations

Abbreviation	Explanation
DC	Direct Current
NTCSA	National Transmission Company South Africa
RFP	Request For Proposal
RS	Radio Site

2.5 Roles and Responsibilities

Suppliers: to respond to the request for proposal for Lithium Ion Phosphate Batteries for Britskop RS and Uitvalskop RS as per the standard and provide the necessary technical support to Telecoms to enable the business to make recommendations on the deployment of Lithium technology at Telecoms radio sites.

Telecommunication Operation and Field Services: To provide site access and ensure that site records are updated and available at supplier/s request.

DC and Auxiliary Supplies Care Group: To register the two sites in terms of the Eskom Pilot site establishment, Standard Guideline for Trial sites or Pilot sites. 240-119185951. Monitor and provide interim and final report on the performance of the Lithium batteries at these two sites.

2.6 Process for Monitoring

Implementation of the scope will be monitored throughout the contract process.

2.7 Related/Supporting Documents

None

3. Site Specific Design (Scope of Work)

Suppliers to respond to the Request for Proposal (RFP) for the design, manufacture at works, testing, quality assurance, delivery to site, off-loading, installation, commissioning, development of training material and provision of training for Lithium-ion Phosphate Batteries for Britskop RS and Uitvalskop RS. Proposal to include 2 x Lithium battery banks per site, Lithium battery cabinet/s or stands, battery management system, battery anti-theft monitoring mechanism (as an option), installation, commissioning, and technical support on the tendered product. The proposal to take into consideration that the offered product will be connected and charged using the existing battery chargers at these sites.

Supplier proposal to meet the DC requirements as detailed below for Britskop RS and Uitvalskop RS.

3.1 Radio site Information

3.1.1 Radio Site Information for Britskop RS and Uitvalskop RS

	Britskop RS	Uitvalskop RS
a) Site Owner or contact person	Vossie Smit	Vossie Smit
b) Contact no.	083 264 2530	083 264 2530
c) Site coordinates	26º45'58"S, 26º57'00"E	27º16'57.9"S, 24º55'38.5"E
d) Vehicle Access	LDV	Bakkie 4 x 2
e) Closes Town	Potchefstroom	Amalia

3.1.2 Existing DC System Installed

Britskop RS and Uitvalskop RS have Dual DC system (battery and charger) installed. **Main 1** and **Main 2.**

3.1.2.1 Existing Batteries on-site

Main 1: Battery Bank	Britskop RS	Uitvalskop RS
Battery type	Lead Acid - Vented	Lead Acid - Vented
Battery manufacturer	Hoppecke 18 OSP HC 1890	Hoppecke 15 OSP HC 1275
Number of cells per bank	24	24

Capacity (A/hr)	1900 A/hr @ C10	1350 A/hr @ C10
Standing Load (A)	40.9A	23A
Standby Time (hours)	45 Hrs.	35 Hrs
Battery commission date	2016/01/01	2017/11/20
Main 2: Battery Bank	**Britskop RS**	**Uitvalskop RS**
Battery type	Same as Main 1 battery bank	Same as Main 1 battery bank
Battery manufacturer		
Number of cells per bank		
Standing Load (A)		
Standby Time (hours)		
Battery commission date	Loan Battery bank installed in October 2023; Main 2 battery bank had to be decommissioned due to short circuits discovered on the cells causing battery bank to heat up excessively.	

3.1.2.2 Existing Chargers onsite

	Britskop RS	Uitvalskop RS
Dual Charger system		
Charger Manufacturer & Type	Siemens	Cordex
Charger Voltage (V)	48 Vdc	48 Vdc
Charger Amperage (A)	300A per charger.	240 A per charger
Charger commission date	1996/01/01 (retrofit control unit)	2017/11/08

3.2 DC New System Design

The current batteries at Britskop RS and Uitvalskop RS needs to be upgraded to meet future DC loading requirements. The supplier is expected to provide a DC system design that will meet the DC loading requirement for Britskop RS and Uitvalskop RS based on the Lithium battery technology.

The DC calculator (Rev 13.94 14/07/2023) attached on Appendix A shows the loading requirements for Britskop RS (**A.1**) and Uitvalskop RS (**A.2**). The DC calculator is based on the existing technology of lead acid battery technology and is attached to show loading requirements for each site.

The supplier is required to submit their own DC system design based on the Lithium technology showing in detail how the sizing of proposed solution was derived to meet site load profile. The DC system design based on Lithium technology must cater for future loading requirement @ 10 % Growth factor with DC standby time of **48 hours** (Uitvalskop RS) and **48 hours** (Britskop RS). Design should be based on a Dual Battery bank system for each site.

3.2.1 Britskop RS Battery Sizing

Note: Battery & Charger Calculations Sheet calculation is based on lead acid battery technology and is attached to show site loading requirements to guide the supplier in sizing their proposed DC system based on Lithium technology.

Based on the Battery & Charger Calculations Sheet (Rev 13.9 14/07/2023)- A.1 two battery banks with a minimum capacity of **3920 A/hr @C10** is required for Britskop RS site with a minimum recharge time of 10 hours and a standby time of 48hours (per battery bank).

3.2.2 Uitvalskop RS Battery Sizing

Based on the Battery & Charger Calculations Sheet (Rev 13.9 14/07/2023)- A.2 two battery banks with a minimum capacity of **2620 A/hr @C10** is required for Uitvalskop RS site with a minimum recharge time of 10 hours and a standby time of 48hours (per battery bank).

3.2.3 Charger Settings and recommendations

The existing battery chargers at Britskop RS and Uitvalskop RS will not be replaced as part of this project however supplier/s will be required to provide Telecoms on the recommended charger settings that will be suitable for the proposed lithium battery technology to ensure optimal functioning.

Suppliers to propose and provide interfacing modules as part of the proposal to ensure optimal charging of lithium batteries where required. Where complete replacement of the battery chargers is recommended, suppliers will be required to provide detailed report with recommendation of the type of chargers that are suitable for the Lithium battery technology to ensure optimal charging of the Lithium batteries.

3.2.4 Site Clarification Meeting

The site clarification meeting will be conducted at Britskop RS and Uitvalskop RS to enable the supplier to gather information from site that will enable the suppliers to respond to the request for proposal. All travelling to site and accommodation requirements will be at supplier cost.

Please refer to section 3.4.1 for Site information details for planning purposes

3.2.5 Delivery to site, off-loading, installation and commissioning.

Delivery to site, off-loading, installation and commissioning to be done in accordance with the standard (240-170000103).

4. Acceptance

This document has been seen and accepted by:

Name	Designation
Vossie Smit	Senior Supervisor Klerksdorp Network Maintenance
Wayne Pringle	Senior Technician NPAE
Bathathu Jonga	Chief Technologist – PTM&C
Phumudzo Bebwele	Senior Engineer NPAE
Mark Ganesan	Central Region Manager

5. Revisions

Date	Rev.	Compiler	Remarks
April 2024	1	N.S Nxumalo	New scope of work document developed.
November 2024	2	N.S Nxumalo	Updated site loading requirement

6. Development Team

- Sandy Nxumalo
- Bathathu Jonga
- Phumudzo Bebwele

7. Acknowledgements

None

Appendix A – Battery & Charger Calculations Sheet

A.1 Britskop RS

Battery & Charger Calculations Sheet		Rev 13.94 14/07/2023
Site Name:- Britskop RS	Britskop RS(Lithium)	
Select the DC Conditions of Site ---------->	48v DC Sites - AC Powered	
Select the Type of Batteries---------->	Flooded Wet Cells {No Aircon Required}	
Select for Airconditioner fitted or not: --->	No Airconditioners	
Select the Type of Site & Priority---------->	Grid tied Backbone	3
Access Issues (Great Distance/Snow)----->	Less than 250kms or 3hrs Drive	
System Redundancy ---------->	2N	Standard

Microwave & BME Equipment

Item	Type	Far Site Name		Equip Current
M/W Link 1	Ericsson 1410	ADM		2.34
M/W Link 2	Ceragon:IP20N 1+1 SDH/Eth IDU	Potchefstroom SS/Charles Shaft SS		6.80
M/W Link 3	Ceragon:IP20N 1+1 SDH/Eth IDU	Hartebeesfontein RS/Klerksdorp Office/Wilkoppies RS		6.80
M/W Link 4	Ceragon:TRUNKED;4+1; 7/8 GHZ SD	Fontana RS		12.88
M/W Link 5	Ceragon:TRUNKED;1+1; 7/8 GHZ	Louwita RS		5.88
M/W Link 6	Ceragon:TRUNKED;4+1; 7/8 GHZ SD	Hermes SS		12.88
M/W Link 7	None			0.00
M/W Link 8	None			0.00
M/W Link 9	None			0.00
M/W Link 10	None			0.00
M/W Link 11	None			0.00
M/W Link 12	None			0.00
BME 3630	Enter in the appropiate no. of Units & Modules used	Units	Modules	
		0	0	0.00
BME 3600	Enter in the modules used in the BME 3600 Sheet			2.88
EAS Systems	Motorola ACE 3600			0.35
Data Routers	Cisco CGR 2010			0.75
MSAP	None			0.00
Other	None			
Total	Total			51.56
SPO1460+PAU	None			0.00
M/W Ancillary	Cisco IR 8340-K9 (1.40A), ASR 903-PE&CE (15A)			16.40
M/W Ancillary	BME Removal			-2.88
M/W Ancillary	ADM Removal			-2.34
M/W Ancillary	E6608 ADM Replacement			6.00

Area Radio Equipment

Area Radio Equipment		Duty Cycle of Equip:- Insert value in Blue		Average Equip Current Drawn from DC Supply
Item	**Voice Circuits Equip.**	**Idle**	**Tx**	
		70	30	
Repeater VHF	Tait TB9300/9400 VHF Repeater 50W	2.20	3.70	2.65
Repeater VHF	Tait TB9300/9400 VHF Repeater 50W	2.20	3.70	2.65
Repeater VHF	None	0.00	0.00	0.00
Single Ch Link	None	0.00	0.00	0.00
Interface	None	0.00	0.00	0.00
Item	**Data Circuits Equip.**	**Rx**	**Tx**	
		70	30	
Repeater UHF	Trio Digital Repeater	0.35	2.50	0.25
Repeater UHF	ExicomUHF Repeater 5W	0.20	4.00	0.34
Repeater UHF	None	0.00	0.00	0.00
Single Ch Link	None	0.00	0.00	0.00
Interface	None	0.00	0.00	0.00
Item	**Link Equip. Cont. Key**	**Rx**	**Tx**	
UHF Link Nr 1	None	0.00	0.00	0.00
UHF Link Nr 2	None	0.00	0.00	0.00
UHF Link Nr 3	None	0.00	0.00	0.00
Area Radio Ancillary Equipment: Add Value as drawn from Charger Supply				0.00

Load Calculation

Total Current drawn by Equipment (incl Growth factor)	82.08	A
ampére-hour Load per Day	1969.9	Ah

Information as to Site & Battery Requirements

SLA Requirements	Standby	48	Hours
	Recovery	10	Hours
Number of Hours Standby Required		48	Hours
Recovery Time in Hours		10	Hours
Growth Factor		10%	%

Calculations when Mains Sites Selected

Recovery Current	608.11	A	
Charger Current Required + 0% Inefficiencies	690.19	A	
Current Available for Charging	608.9	A	
Battery Efficiency (Depends on Type of Cells & if Aircon fitted or not)	90%	%	
Battery Capacity Required	Dual 48V battery bank,i.e 2 banks X	5473	Ah
Charger Capacity Required	Dual 48V Charger	691	A
NEW Battery Bank Installed/Actual size to be installed	3920	Ah	
NEW Charger Current required based on installed battery	700	A	
NEW Standby Time on new batteries	38.0	Hours	

A.2 Uitvalskop RS

Battery & Charger Calculations Sheet			Rev 13.94 14/07/2023
Site Name:-	Uitvalskop RS (Lithium)		
Select the DC Conditions of Site ---------->	48v DC Sites - AC Powered		
Select the Type of Batteries---------->	Flooded Wet Cells {No Aircon Required}		
Select for Airconditioner fitted or not: --->	No Airconditioners		
Select the Type of Site & Priority---------->	Grid tied Backbone		3
Access Issues (Great Distance/Snow)----->	Less than 250kms or 3hrs Drive		
System Redundancy ---------->	2N		Standard

Microwave & BME Equipment

Item	Type	Far Site Name		Equip Current
M/W Link 1	Ericsson 1410	Ericsson ADM		2.34
M/W Link 2	Ceragon:IP20N 1+1 SDH/Eth IDU	Taung RS/Schweizer-Reneke RS/Mookodi SS		6.80
M/W Link 3	None			0.00
M/W Link 4	None			0.00
M/W Link 5	None			0.00
M/W Link 6	None			0.00
M/W Link 7	None			0.00
M/W Link 8	None			0.00
M/W Link 9	None			0.00
M/W Link 10	None			0.00
M/W Link 11	None			0.00
M/W Link 12	None			0.00
BME 3630	Enter in the appropiate no. of Units & Modules used	Units	Modules	
		0	0	0.00
BME 3600	Enter in the modules used in the BME 3600 Sheet			1.48
EAS Systems	Motorola ACE 3600			0.35
Data Routers	Cisco CGR 2010			0.75
MSAP	None			0.00
Other	None			
Total	Total			11.72
SPO1460+PAU	None			0.00
M/W Ancillary	BME Removal			-1.48
M/W Ancillary	BME replacement Cisco IR 8340-K9 and CE Router			13.40
M/W Ancillary	ADM Removal			-2.34
M/W Ancillary	E6608 ADM Replacement			6.00

Area Radio Equipment

Area Radio Equipment		Duty Cycle of Equip:- Insert value in Blue		Average Equip Current Drawn from DC Supply
Item	**Voice Circuits Equip.**	**Idle**	**Tx**	
		70	30	
Repeater VHF	Tait TB9300/9400 VHF Repeater 5	2.20	3.70	2.65
Repeater VHF	None	0.00	0.00	0.00
Repeater VHF	None	0.00	0.00	0.00
Single Ch Link	None	0.00	0.00	0.00
Interface	None	0.00	0.00	0.00
Item	**Data Circuits Equip.**	**Rx**	**Tx**	
		70	30	
Repeater UHF	Trio Digital Repeater	0.35	2.50	0.25
Repeater UHF	None	0.00	0.00	0.00
Repeater UHF	None	0.00	0.00	0.00
Single Ch Link	None	0.00	0.00	0.00
Interface	None	0.00	0.00	0.00
Item	**Link Equip. Cont. Key**	**Rx**	**Tx**	
UHF Link Nr 1	Exicom Hawk 2Ch Link 1W	1.70	1.70	0.43
UHF Link Nr 2	None	0.00	0.00	0.00
UHF Link Nr 3	None	0.00	0.00	0.00
Area Radio Ancillary Equipment: Add Value as drawn from Charger Supply				0.00

Load Calculation

Total Current drawn by Equipment (incl Growth factor)	33.69	A
ampére-hour Load per Day	808.4	Ah

Information as to Site & Battery Requirements

SLA Requirements	Standby	48	Hours
	Recovery	10	Hours
Number of Hours Standby Required		48	Hours
Recovery Time in Hours		10	Hours
Growth Factor		10%	%

Calculations when Mains Sites Selected

Recovery Current	249.56	A	
Charger Current Required + 0% Inefficiencies	283.24	A	
Current Available for Charging	250.3	A	
Battery Efficiency (Depends on Type of Cells & if Aircon fitted or not)	90%	%	
Battery Capacity Required ual 48V battery bank,i.e 2 banks X	2246	Ah	
Charger Capacity Required Dual 48V Charger	284	A	
NEW Battery Bank Installed/Actual size to be installed	2620	Ah	
NEW Charger Current required based on installed battery	325	A	
NEW Standby Time on new batteries	62.0	Ah	