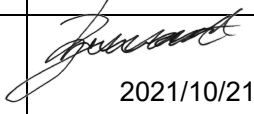




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ANNEXURE A

EVALUATION CRITERIA

The tenders will be technically evaluated after the contractors have submitted their quality and safety related documents as requested by the employer's representative including other tenderer returnable.

Evaluation Date:	Name and Surname	Designation	Signature:
Technical Evaluation Done by:	Lemuël Zwart	C&I Engineer	 2021/10/21
Supported by:	Hans-Jürgen Gadinger	Senior C&I Engineer	
Verified by:	Vero Masuku	C&I Engineering Manager	 2021-10-21

1. SCOPE OF WORK

The Human-Machine Interface of the Outside Plant Control Room Supervisory Control and Data Acquisition system performs two main functions – that of displaying data relating to the operation of the outside plant equipment to the operators, as well as the forwarding of this data to the station historian. Currently, no remote control operations are present in the SCADA.

The technologies used in the OPCR SCADA HMI have been obsolete for a number of years, and issues relating to the procurement of spares and the availability of maintenance skills have been increasing steadily. It has therefore been decided to replace the HMI system with a state-of-the-art industry-standard equivalent. Not only will this upgrade mitigate the existing risks associated with obsolescence, but also provide additional functionality not available when the HMI was originally installed. Of chief advantage will be the ability to perform forward engineering, and to perform remote maintenance of control equipment. Future expansion of the outside plant SCADA network will also be enabled, as the system is currently operating near capacity. This expansion will include the capacity to perform remote operator actions from the HMI system.

Some changes will be required to the SCADA network itself in order to allow communication to the new HMI, as well as to enable the additional features for example remote plant control and not just viewing capabilities. The sections to follow will provide details to this effect.

1.1. High level scope of the Works

- (1) Engineering, design, procurement, manufacturing, factory acceptance testing, delivery, off-loading at site, storage, installation, testing, commissioning, and as-built documentation for the Duvha outside plant Human Machine Interface (HMI).

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- (2) The specific sub-systems provided as part of Duvha outside plant HMI System include – but are not limited to the following:
 - i. Location in Water treatment plant server room for HMI hardware
 - ii. Existing interface to L2 connected plant via Profinet enabled gateway
 - iii. Fibre link to site historian from WTP server room
 - iv. Redundant power supply to server room
- (3) The specific sub-systems to be provided as part of the Duvha HMI system include – but are not limited to the following:
 - i. HMI system with 2 quad view operator stations extended via KVM.
 - ii. Engineering system
 - iii. Profinet control network for HMI
 - iv. GPS Time sync system
 - v. Backup & recovery system
 - vi. Electronic security perimeter
 - vii. Power distribution systems
 - viii. OPC connection to site historian
- (2) Connecting the FAC PLC's to the marshalling PLC and communication setup for FAC signals and alarms for HMI mimics.
- (4) Removal and/or relocation of existing equipment where required by new design
- (5) Plant and labelling of all equipment supplied as part of the works
- (6) Earthing of all equipment supplied as part of the works
- (7) Training of Operating, Engineering & Maintenance staff
- (8) All activities, services or equipment specified (special tools, consumables, etc.)
- (9) All software, license and copyright agreements for the works.

2. MATERIALS

2.1. Quality

- (1) All work is carried out under the supervision of an experienced supervisor.
- (2) The Contractor complies with the Employer's Quality Requirements as specified in Eskom Generation Standard QM58. The Contractor, when using materials that are required to comply with a standard specification
- (3) Shall, if so ordered, furnish the Engineer with certificates showing that the materials do so comply.
- (4) Where so specified, materials shall bear the official mark of the appropriate standard.

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- (5) Samples ordered or specified shall be delivered to the Engineer's office on the Site.
- (6) Unless otherwise specified, all proprietary materials shall be used and placed in strict accordance with the published instructions of the relevant manufacturer.
- (7) All quality control documentation is submitted to the Project Manager within 7 days of Contract date.

2.2. Plant & Materials provided “free issue” by the *Employer*

- (1) The Employer will provide power supply, water and land for the storage of equipment and material.
- (2) The Contractor shall supply all the necessary equipment and material required to execute the Works.
- (3) Should the Contractor require using of any of the Employer's Equipment, including compressed air, electricity, water supply and crane age, it must be specified in the Works Information supplied by the Contractor.
- (4) The Employer does not guarantee continuity of supply of any of these items required in point 3.
- (5) Any site establishment will be discussed and agreed upon between the Project Manager and the Contractor.

2.3. Contractor's procurement of Plant and Materials

- (1) The Contractor shall make use of SABS approved plant and material.
- (2) Test certificates shall be given to the Project Manager of the project.
- (3) The Contractor's material should comply with the Eskom Standards as a minimum.

2.4. Spares and consumables

- (1) The Contactor must supply a recommendation for spares holding based on the project requirements and the Employer's goals.

3. PURPOSE

- (1) The Human-Machine Interface (HMI) of the outside plant Supervisory Control and Data Acquisition (SCADA) system performs two main functions – that of displaying data relating to the operation of the outside plant equipment to the operators, as well as the forwarding of this data to the station historian.
- (2) The system as currently installed comprises of:

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- i. 15 x S5 PLCs (all on L2 network)
 - ii. 16 x S7 PLCs, (2 on L2 network, 10 on Profinet network, 4 not connected)
 - iii. S7 marshalling PLC to condense data on L2 network and Profinet.
 - iv. Outside plant SCADA system (iFix v2.5 on Windows NT)
 - v. 13 x Modicon TSX Compact PLCs
 - vi. 6 x Schneider M340 PLCs
 - vii. Overland conveyor SCADA system (Wonderware on Windows XP)
 - viii. Interface to PIS network and site historian.
- (3) The Outside Plant SCADA is a network of Siemens S5 and S7 PLCs responsible for monitoring of Outside Plant equipment. All of the PLCs communicate with an S7-400 marshalling PLC located at LP services via L2 FDL serial communication and Profinet Ethernet communication. The North and South CW, H2 and LPS plants are connected to the marshalling PLC via L2 FDL. The Bunker, MWR, AWR, SWB and FAC PLCs are connected to the marshalling PLC via Profinet. The marshalling PLC reduces the amount of communication packets on the bus by concentrating the data from the plants from 27 communication packets down to 9 packets. The link between the marshalling PLC and the SCADA Gateway machine uses L2 FDL.
- (4) The SCADA gateway computer is connected to the marshalling PLC via a specialised L2 interface card. A quad-monitor View computer is used to display data captured by the Gateway on process graphics. The View and Gateway computers together form the Human Machine Interface. Intellution iFix v2.5 is used to provide the process graphics and alarm system and is currently installed on Windows NT.
- (5) The Gateway computer also feeds data to the Process Information System (PIS), over the Process Network. This connection utilises a custom written software driver, provided by the PIS vendor.
- (6) The Outside plant control room further houses SCADA equipment for the Overland conveyor system. The HMI for this separate system is implemented using a single computer, which performs both Gateway and View functions. A ModbusPlus serial card is installed in the computer, which allows communication to the Schneider PLCs located in the Overland and Staithe Substations. Wonderware software running on Microsoft Windows XP is used to display information regarding the conveyors to the operator, as well as to input commands to the PLCs.
- (7) The technologies used in the outside plant SCADA HMI have passed their usable lifetime, and issues relating to the procurement of spares and the availability of maintenance skills have been increasing steadily. It has therefore been decided to replace the HMI system with a state-

of-the-art industry-standard equivalent. Not only will this upgrade mitigate the existing risks associated with obsolescence, but also provide additional functionality for example remote operations which was not available when the HMI was originally installed.

- (8) The S5 and TSX Compact PLCs are obsolete. The S7 and M340 PLCs are still supported by their respective manufacturer.
- (9) The outside plant system is presented below.

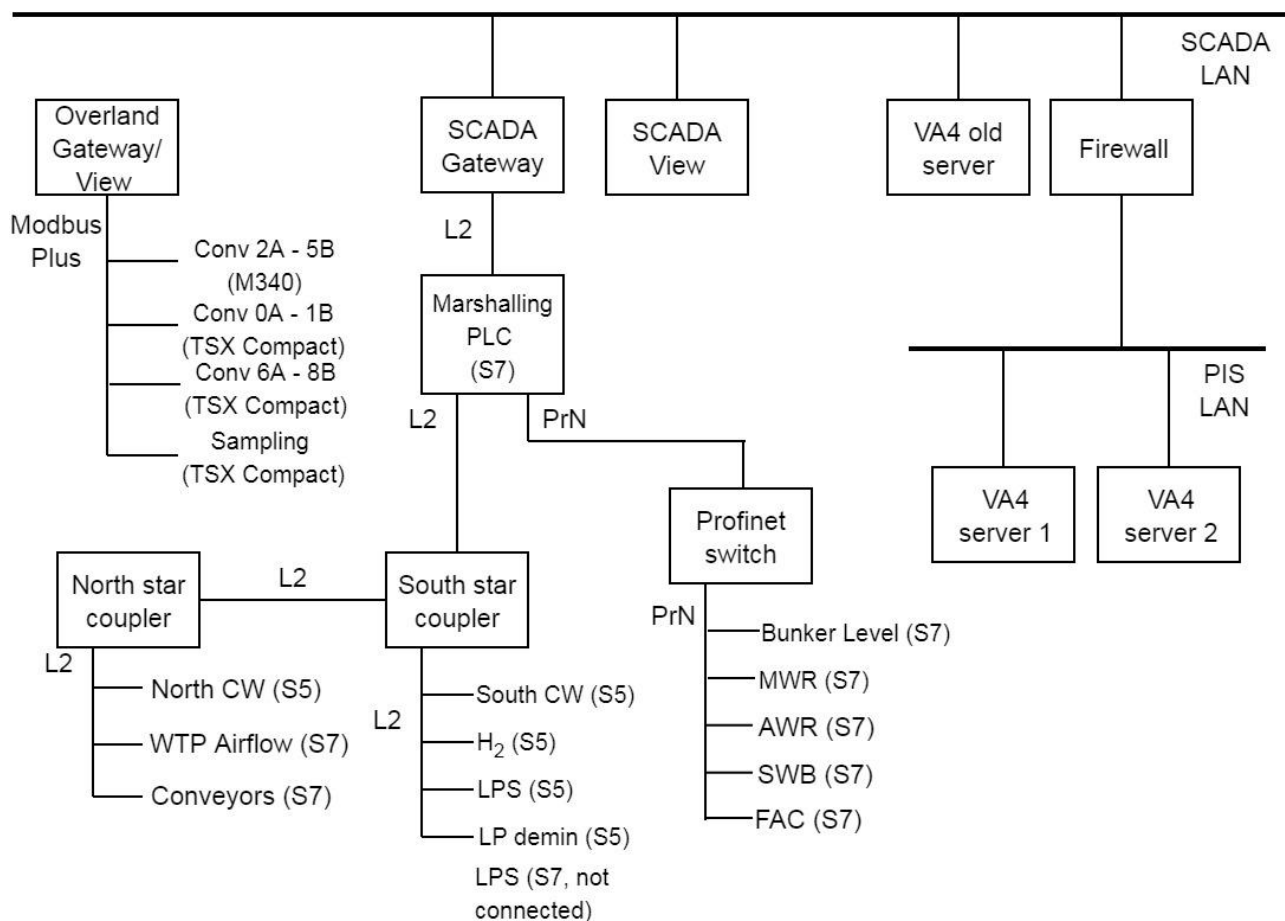


Figure 1: Outside plant as-is

3.1.Purpose of the scope work

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- (1) The following are the main objectives of the scope of work:
- i. Installation of new outside plant HMI system
 - ii. Migrating existing graphics and control schemes to new HMI
 - iii. Establish new ProfiNet based network segment
 - iv. Integrating overland conveyor system into outside plant HMI
 - v. Integrated engineering system for outside plant.
 - vi. Connecting FAC PLC's to the marshalling PLC.
 - vii. Communication setup for FAC signals and alarms on marshalling PLC.
- (2) Obsolescence risk of HMI on outside plant to be eliminated.

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4. EVALUATION SUMMARY

Mandatory Technical Evaluation Criteria		Meet	Proof Provided by Tenderer. Motivation & Comments
		(YES / NO)	
1	The proposed HMI system has been successfully installed, commissioned and made operational by the Tenderer in at least three continuous operational plants or similar industrial plants. Provide all relevant information.	Yes	
2	The Tenderer has executed a change-over to the proposed system in at least two other projects. Provide all relevant information.	Yes	
3	The Tender confirms through OEM letter that the product life cycle of the proposed HMI software is currently still supported for a minimum of 6 years after completion of the project's date	Yes	
3	The Tenderer confirms that the HMI system will be replaced by ensuring that the following phases are completed: <i>Investigation, Supply, Engineering, design, procurement, manufacturing, assembly, factory acceptance testing, delivery, off-loading at site, storage, rigging, installation, codification, testing, commissioning, decommissioning, optimisation, as-built documentation for and training.</i>	Yes	
4	The Tenderer proves that all current HMI GUI Display Types and alarm annunciators will be replicated in terms of functionality, look and feel.	Yes	

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5	The Tenderer proves that the proposed system can successfully interface to the exiting PLC Ethernet, Marshalling PLC, OPC Interface to the redundant link VA Historian, and overland conveyor system.	Yes	
	RESULT	QUALIFIED	
<i>Note: A response of "NO" to any of the Mandatory Evaluation Criteria would result in a "NO".</i>			

1	SUB-SECTION: PROJECT EXECUTION METHODOLOGY (Weighting - 10 %)		
Qualitative Technical Evaluation Criteria		Score [0,2,4,5]	Proof Provided by Tenderer. Motivation & Comments (Identified risk(s) / exceptions / conditions)
1,1	Programming Constraints		
1	Schedule submitted using latest version of MS Project and PDF. The programme submitted is in at a level 3 in PDF file.	0/2/4/5	
2	Commissioning Activities are shown in hours	0/2/4/5	
3	The calendar must be clearly shown and must be 7 days week, 8 hours a day, indicating pay weekend (negotiable).	0/2/4/5	
4	Schedule includes activities to the Sub-system/Work Package level of the Works Information Package level.	0/2/4/5	
5	The schedule also includes all procurement activities, quality hold points and engineering hold points and reviews.	0/2/4/5	
6	Method statement to be submitted, this must align with the Project activities.	0/2/4/5	

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7	Schedule is resource loaded for evaluation purposes, Activities are WBS coded, and Activities align with the Method Statement.	0/2/4/5	
8	The following must be in the programme:-a) All project Milestones i.e. Procurement, Manufacturing, Delivery etc. b) Project key dates. c) Engineering and Quality hold point milestones. d) Interface dates. e) Commissioning key dates and interfaces.	0/2/4/5	
9	Project Milestones are indicated.	0/2/4/5	
	Result Total (%)	10,00	
Remarks			

1	SUB-SECTION: PROJECT EXECUTION METHODOLOGY (Weighting - 10 %)		
Qualitative Technical Evaluation Criteria		Score [0,2,4,5]	Proof Provided by Tenderer. Motivation & Comments (Identified risk(s) / exceptions / conditions)
1,2	Basic Engineering		
1	Provide a list of envisaged long lead items and typical procurement times for these items.	0/2/4/5	
1,3	Detailed Engineering		
1	Based on the input documentation and the activities that will be undertaken during Basic Engineering, what is the Tenderer's methodology to get to a Detailed Engineering design for the system?	0/2/4/5	

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2	Provide a life-cycle cost analysis of the proposed solution. As a minimum, the analysis accounts for the following costs: - Acquisition costs (including design and development) - Operating costs (including cost of repairs and spares) - Maintenance costs - Support costs (such as upgrading or migration costs) - Disposal costs	0/2/4/5	
1,4	FAT		
1	Based on the proposed solution, what is the Tenderer's approach to FAT? Please provide a detailed testing methodology that describes this approach for all systems/sub-systems/equipment supplied as part of the <i>works</i> .	0/2/4/5	
2	Provide the location of FAT, as well as the expected duration of FAT based on the proposed solution, scope of work, and testing methodology.	0/2/4/5	
1,5	Procurement, Erection & Installation		
1	Based on the Tenderer's proposal, what infrastructure is required for successful installation of the new network and its components.	0/2/4/5	
2	Provide a change-over strategy that describes the methodology for changing over of the: HMI, networks, screen, etc.	0/2/4/5	
4	Describe how and to what extent the new system will be tested once connected (i.e. powered up, communication established etc.).	0/2/4/5	
5	Based on the risk considerations as per 2.13.7 and risks from the Tenderer's own experience, provide options for the recovery of the system.	0/2/4/5	
1,6	SIT		

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1	What is the Tenderer's recommendation for the scope of SIT?	0/2/4/5	
2	Provide a list of all electrical loads required for successful SIT.	0/2/4/5	
3	Provide a detailed power supply methodology to be used during SIT.	0/2/4/5	
4	Does the SIT have sufficient detail such as durations, resources, equipment or tools, etc	0/2/4/5	
1,7	Commissioning		
1	Provide a commissioning strategy that describes the methodology for undertaking cold and hot commissioning of the system.	0/2/4/5	
2	Provide an Operation Acceptance Test (OAT) procedure for testing the functionality of the System from the Operator System.	0/2/4/5	
	Result Total (%)	10,00	
Remarks			

2	SUB-SECTION: PROJECT ORGANISATION AND RESOURCES (Weighting -15 %)		
Qualitative Technical Evaluation Criteria		Score	Proof Provided by Tenderer. Motivation & Comments (Identified risk(s) / exceptions / conditions)
		[0,2,4,5]	
2,1	General Requirements		

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1	Provide a detailed organogram for the Duvha project that indicates the organisational hierarchal structure, the lines of communication and critical relations between the different employees (by name and expertise), including the OEM and all outsourced sub-contracting organisations and their interaction with the Employer. As a minimum, the following positions are clearly identified and have CV's provided: - Project Manager - Lead Engineer - Commissioning Engineer - Commissioning Specialists - Quality Controller - Other resources Does the project team have the required and adequate levels of qualifications and experience	0/2/4/5	
	Result Total (%)	15,00	
Remarks			

3	SUB-SECTION: QUALITY AND PERFORMANCE REQUIREMENTS (Weighting - 15 %)		
Qualitative Technical Evaluation Criteria		Score	Proof Provided by Tenderer. Motivation & Comments (Identified risk(s) / exceptions / conditions)
		[0,2,4,5]	
3,1	System Performance		
1	Provide the reliability and availability calculations for the System. Clearly indicate the sources of all empirical data and assumptions.	0/2/4/5	

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2	Provide the MTBF and MTTR of components that form part of the System. The basis from which these values are calculated are detailed and all assumptions are listed. Included must be FMA for single-point-of-failure.	0/2/4/5	
3	Describe the life expectancy of the proposed system, the current phase of its lifecycle, the strategy for supporting the system over its life.	0/2/4/5	
3,2	Technical Documentation		
1	Provide all OEM standards, best practices, guidelines and QA practices to which the works provided by the Tenderer adheres to.	0/2/4/5	
2	Provide all details of conflicts to the referenced standards, technical guide lines and Tenderer practices to meet the enquiry requirements.	0/2/4/5	
3	Explain how the documents provided by the Tenderer will comply with the relevant standards in the works.	0/2/4/5	
4	How will the Tenderer ensure high quality	0/2/4/5	
5	Detailed design, operating and maintenance manuals.	0/2/4/5	
	Result Total (%)	15,00	
Remarks			

4	SUB-SECTION: CONTROL SYSTEM (Weighting - 40 %)		
Qualitative Technical Evaluation Criteria		Score	Proof Provided by Tenderer. Motivation & Comments (Identified risk(s) / exceptions / conditions)
		[0,2,4,5]	
4,1	General Requirements		

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1	The executive overview supports the Technical Tender Returnables and addresses the following aspects as a minimum: <ul style="list-style-type: none"> • Selected system technology • Overall structure and configuration of the system • Networking, communication concepts and connections plant bus • Engineering Tools • Operator interface aspects • Power supply distribution • Identified risks and mitigating strategies 	0/2/4/5	
2	Provide a detailed architecture and topology diagram (which includes all servers, clients, switches, communication media, peripherals, printers, firewalls, subnets etc.) proving that the Employers requirements are understood and can be met.	0/2/4/5	
3	Provide the concept for redundancy that will employed to meet the requirements of the <i>works</i> . This concept is aligned to the proposed system and network architecture.	0/2/4/5	
4,2	Specific Requirements of the HMI System (as per the Works Information)		
1	Design criteria as per 3.2.1	0/2/4/5	
2	Examples of HMI as per 3.2.2 and Eskom Standards	0/2/4/5	
3	System Architecture as per 3.2.4	0/2/4/5	
4	External Interfaces as per 3.2.5	0/2/4/5	
5	Adherence to Maintenance concept as per 3.2.6 and evidence	0/2/4/5	
6	Adherence to Operating concept as per 3.2.7 and evidence	0/2/4/5	
7	Design based on adherence to 3.2.10	0/2/4/5	
8	Provide details with samples of the alarm management design as per 3.2.12	0/2/4/5	
9	Anti-virus requirements as per 3.2.13	0/2/4/5	

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10	Central update System requirements as per 3.2.14	0/2/4/5	
11	Time synchronisation requirements as per 3.2.15	0/2/4/5	
12	Electrical and Equipment cabinet requirements as per 3.2.16. Also, provide a complete power distribution drawing of the cabinet.	0/2/4/5	
13	Comprehensive network management system. Provide a detailed network management strategy explaining how the workstations, servers, network equipment and the network will be managed.	0/2/4/5	
14	Provide details of the architecture and configuration of the Backup & Restore system to be supplied as part of proposed solution, as per the requirements in the Works Information. Provide details on the Back-up, Data Recovery and Archiving processes. (disaster recovery)	0/2/4/5	
13	All secondary HMI system functionality including; redundancy with automatic cross failover, database management, online process calculations, centralised backup & restore, central anti-virus update & rollout system, user access management and system health and status reporting.	0/2/4/5	
14	Interfacing between the new HMI system and existing plant bus	0/2/4/5	
15	Interfacing between the new HMI system and the existing station historian - the HMI station historian interface to dual direction, full redundancy with automatic fail over, data buffering and automatic restore functionality	0/2/4/5	
16	Cyber security requirements 3.2.11	0/2/4/5	
19	What is the life cycle of the proposed solution? What operating systems are to be used?	0/2/4/5	

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20	Software license requirements as per 3.2.17. Provide a strategy of how the licenses will be managed throughout the life of the system. Include a list of the type and number of licenses being offered as part of the proposed solution. How is the replacement of faulty equipment affected by the licensing strategy?	0/2/4/5	
21	Does the proposed system leverage virtualisation technology to ensure that a variety of hardware (computers) can be used with the same software?	0/2/4/5	
	Result Total (%)	40,00	
Remarks			

5	SUB-SECTION: POWER DISTRIBUTION, SUPPLIES AND CONSUMPTIONS (Weighting - 10 %)		
Qualitative Technical Evaluation Criteria		Score	Proof Provided by Tenderer. Motivation & Comments (Identified risk(s) / exceptions / conditions)
		[0,2,4,5]	
5,1	Electrical Interfaces		
1	Provide a conceptual layout drawing of internal cabinet distribution.	0/2/4/5	
2	Provide a conceptual layout drawing of the overall system power distribution	0/2/4/5	
3	Provide the power usage of all devices	0/2/4/5	

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4	Power cable design and implementation for the different HMI Clients, Servers and Network infrastructure; and the use of Uninterrupted Power Supply (UPS). Power supply connection and distribution	0/2/4/5	
5	Electrical specifications as per 3.2.3 and 3.2.4	0/2/4/5	
	Result Total (%)	10,00	
Remarks			

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5. DETAILED EVALUATION

For the mandatory scoring, if the tenderer did not meet any requirement (“No”), the tenderer will not qualify for further evaluation. Each section will be scored with a score as shown in the table below.

Table 1: Qualitative Evaluation Criteria Scoring Table

Score	(%)	Definition
5	100	COMPLIANT <ul style="list-style-type: none"> • Meet technical requirement(s) AND; • No foreseen technical risk(s) in meeting technical requirements.
4	80	COMPLIANT WITH ASSOCIATED QUALIFICATIONS Meet technical requirement(s) with; <ul style="list-style-type: none"> • Acceptable technical risk(s) AND/OR; • Acceptable exceptions AND/OR; • Acceptable conditions.
2	40	NON-COMPLIANT <ul style="list-style-type: none"> • Does not meet technical requirement(s) AND/OR; • Unacceptable technical risk(s) AND/OR; • Unacceptable exceptions AND/OR; • Unacceptable conditions.
0	0	TOTALLY DEFICIENT OR NON-RESPONSIVE

6. RECOMMENDATION