Request for Proposals (RFP)

For the Provision of 11kV Switch Room Upgrade at CSIR Scientia, Pretoria.

RFP No. 3702/17/10/2025

Date of Issue	Tuesday, 16 September 2025	
Compulsory Briefing Site Inspection	Date Time	29 September 2025 10:00 – 11:00
	Address	Outside Building 26 CSIR Scientia Campus Meiring Naudé Road Brummeria, Pretoria
Enquiries	Strategic Procurement Unit	E-mail: tender@csir.co.za
	Please use RFP No and RFP Description as subject reference	
Last date for submission of enquiries/clarifications	Wednesday, 01 October 2025 @ 16H30	
Electronical Submission	tender@csir.co.za (If tender submission exceeds 25MB multiple emails can be sent)	
CSIR business hours	08h00 – 16h30	
Category	Construction	
Closing Date and Time	Friday, 17 October 2025 @ 16H30	

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SECTION A

GENERAL RFP TERMS AND CONDITIONS

1 INTRODUCTION

The Council for Scientific and Industrial Research (CSIR) is one of the leading scientific research and technology development organisations in Africa. In partnership with national and international research and technology institutions, the CSIR undertakes directed and multidisciplinary research and technology innovation that contributes to the improvement of the quality of life of South Africans. The CSIR's main site is in Pretoria while it is represented in other provinces of South Africa through regional offices.

2 SUBMISSION OF PROPOSALS

2.1 All proposals are to be submitted electronically to **tender@csir.co.za**. No late proposals will be accepted.

2.2 All proposals will only be considered if received by the CSIR before the closing date and time (***as indicated on the cover page***). The CSIR business hours are between **08h00** and **16h30**.

2.3 All proposal submissions are to be clearly subject referenced with the **RFP number and RFP Description**. Proposals must consist of two parts, each of which must be sent in two separate emails with the following subject:

PART 1: Technical Proposal **(Please indicated the RFP Number on each File/folder)**
PART 2: Pricing Proposal, Specific Goals claim documentation: **(Please indicated the RFP Number on each File/folder)**

2.4 Proposals submitted must be signed by a person or persons duly authorised.

2.5 Proposals submitted at incorrect location and/or address, will not be accepted for considerations and where practicable, will be returned unopened to the Bidder(s).

2.6 Proposals received after the closing date and time, at the address indicated in the bid documents, will not be accepted for consideration and where practicable, will be returned unopened to the Bidder(s).

2.7 All dates and times in this bid are South African standard time.

2.8 Any time or date in this bid is subject to change at the CSIR's discretion. The establishment of a time or date in this bid does not create an obligation on the part of the CSIR to take any action or create any right in any way for any bidder to demand that any action be taken on the date established. The bidder accepts that, if the CSIR extends the deadline for bid submission (the Closing Date) for any reason, the requirements of this bid otherwise apply equally to the extended deadline.

2.9 Documents submitted via cloud solutions such as: WeTransfer, Google Drive, Dropbox, etc. will not be considered.

2.10 The naming / labelling syntax of files or documents must be short and simple.

2.11 The CSIR will award the contract to qualified bidder(s)' whose proposal is determined to be the most advantageous to the CSIR, taking into consideration the technical (functional) solution, price, specific goals and objective criteria.

3 COUNTER CONDITIONS

Bidders' attention is drawn to the fact that amendments to any of the RFP Conditions or setting of counter conditions by Bidders or qualifying any RFP Conditions will result in the invalidation of such bids.

4 FRONTING

4.1 Government supports the spirit of broad based black economic empowerment and recognizes that real empowerment can only be achieved through individuals and businesses conducting themselves in accordance with the Constitution and in an honest, fair, equitable, transparent and legally compliant manner. Against this background the Government condemn any form of fronting.

4.2 The Government, in ensuring that Bidders conduct themselves in an honest manner will, as part of the RFP evaluation processes, conduct or initiate the necessary enquiries/investigations to determine the accuracy of the representation made in bid documents. Should any of the fronting indicators as contained in the Guidelines on Complex Structures and Transactions and Fronting, issued by the Department of Trade and Industry, be established during such enquiry / investigation, the onus will be on the Bidder / contractor

to prove that fronting does not exist. Failure to do so within a period of 14 days from date of notification may invalidate the bid / contract and may also result in the restriction of the Bidder /contractor to conduct business with the public sector for a period not exceeding ten years, in addition to any other remedies the CSIR may have against the Bidder / contractor concerned.

5 PRICING PROPOSAL

5.1 Pricing must be provided in South African Rand (including all applicable taxes less all unconditional discounts).

5.2 Prices that are subject to escalation and exchange rate fluctuations are to be clearly indicated, with the currency and ROE used in the quotation must be clearly indicated.

5.3 Price should include additional cost elements such as travel cost, freight, insurance until acceptance, duty where applicable, etc.

5.4 Payment will be according to the CSIR Payment Terms and Conditions.

5.5 Please provide a detail pricing using a Pricing Schedule/Bill of Quantities outlined under **Annexure D. Pricing must strictly be in accordance with the Pricing Schedule.**

5.6 The contractor is to make provision in the pricing for labour during overtime working in instances where outages are being affected and works need to be completed out of business hours to avoid power supply disruptions to the operations of the CSIR.

6 APPOINTMENT OF SERVICE PROVIDER

6.1 The contract will be awarded to the bidder who scores the highest total number of points during the evaluation process, except where the law permits otherwise.

6.2 Appointment as a successful service provider shall be subject to the parties agreeing to mutually acceptable contractual terms and conditions. In the event of the parties failing to reach such agreement, CSIR reserves the right to appoint an alternative supplier.

6.3 Awarding of contracts will be published on the same platform where the bid was published, and no regret letters will be sent to unsuccessful bidders.

7 SERVICE LEVEL AGREEMENT

7.1 Upon award the CSIR and the successful bidder will conclude Supplier Agreement (Draft) and **GCC Contract (Annexure K)** regulating the specific terms and conditions applicable to the services being procured by the CSIR.

7.2 The contractor shall achieve in the performance of the Contract the Contract Skills Development Goal (CSDG) established in the CIDB Standard for Developing Skills through Infrastructure Contracts, published in Gazette Notice No. 48495 of 28 April 2023**.**

8 ENQUIRIES AND CONTACT WITH THE CSIR

Any enquiry regarding this RFP shall be submitted in writing to CSIR to the email and format outlined in the table on cover page of this RFP document.

Any other contact with CSIR personnel involved in this tender is not permitted during the RFP process other than as required through existing service arrangements or as requested by the CSIR as part of the RFP process.

9 MEDIUM OF COMMUNICATION

All documentation submitted in response to this RFP must be in English.

10 CORRECTNESS OF RESPONSES

10.1 The bidder must confirm satisfaction regarding the correctness and validity of their proposal and that all prices and rates quoted cover all the work/items specified in the RFP. The prices and rates quoted must cover all obligations under any resulting contract.

10.2 The bidder accepts that any mistakes regarding prices and calculations will be at their own risk.

11 VERIFICATION OF DOCUMENTS

11.1 Bidders should check the numbers of the pages to satisfy themselves that none is missing or duplicated. No liability will be accepted by the CSIR in regard to anything arising from the fact that pages are missing or duplicated.

11.2 Pricing schedule and specific goals credentials should be submitted with the proposal, but as a separate document and no such information should be available in the technical proposal.

12 RESPONSIBILITY FOR SUB-CONTRACTORS AND BIDDER'S PERSONNEL

A bidder is responsible for ensuring that its personnel (including agents, officers, directors, employees, advisors and other representatives), its sub-contractors (if any) and personnel of its sub-contractors comply with all terms and conditions of this bid. In the event that the CSIR allows a bidder to make use of sub-contractors, such sub-contractors will at all times remain the responsibility of the bidder and the CSIR will not under any circumstances be liable for any losses or damages incurred by or caused by such sub-contractors.

13 ADDITIONAL TERMS AND CONDITIONS

13.1 A bidder shall not assume that information and/or documents supplied to CSIR, at any time prior to this request, are still available to CSIR, and shall consequently not make any reference to such information document in its response to this request.

13.2 Copies of any affiliations, memberships and/or accreditations that support your submission must be included in the tender.

13.3 In case of proposal/s from a joint venture, the following must be submitted together with the proposal/s:

- A joint venture agreement signed by both parties clearly indication the lead partner, including split of work;
- Copy of a valid certificate or consolidated B-BBEE score card;
- The Tax Compliance Status (TCS) or CSD Report of each joint venture partner;
- Proof of ownership/shareholder certificates/copies; and
- Company registration certificate/s.

13.4 An omission to disclose material information, a factual inaccuracy, and/or a misrepresentation of fact may result in the disqualification of a tender, or cancellation of any subsequent contract.

13.5 No goods and/or services should be delivered to the CSIR without an official CSIR Purchase order or signed supplier agreement. The CSIR purchase order number must be quoted on the invoice. Invoices without CSIR purchase order numbers will be returned to supplier.

13.6 Failure to comply with any of the terms and conditions as set out in this document will invalidate the Proposal.

14 SPECIAL CONDITIONS

The CSIR reserves the right to:

14.1 Extend the closing date of this RFP;

14.2 Correct any mistakes before closing date and time of the tender that may have been in the Bid documents or occurred at any stage of the tender process;

14.3 Verify any information contained in the bidder's submission;

14.4 Request documentary proof regarding the bidder's submission;

14.5 Carry out site inspections, product evaluations or explanatory meetings in order to verify the nature and quality of the product/service offered by the bidder(s) or verify any information whether before or after the adjudication of this RFP;

14.6 Award this tender to a bidder that did not score the highest total number of points, only in accordance with Section 2(1)(f) of the PPPFA (Act 5 of 2000);

14.7 Request audited financial statements or other documents for the purpose of a due diligence exercise to determine if the bidder will be able to execute the contract;

14.8 Award this RFP as a whole or in part;

14.9 Award this RFP to multiple bidders;

14.10 Cancel and/or terminate the tender process at any stage, including after the Closing Date and/or after presentations have been made, and/or after tenders have been evaluated and/or after the preferred bidder(s) have been notified of their status as such;

14.11 Post tender negotiate on any elements on the bid, including but not limited to technical, transformation, price, and contractual terms and conditions.;

14.12 Not to award a contract to a bidder who is associated with a security breach that materially adversely affects other entities or if any directors or officers of a bidder are formally charged of fraudulent or illegal conduct which, would harm the CSIR's reputation by its continued association with the bidder.

15 CONFLICT OF INTEREST, CORRUPTION AND FRAUD

15.1 The CSIR reserves its right to disqualify any bidder who either itself or any of whose members (save for such members who hold a minority interest in the bidder through shares listed on any recognised stock exchange), indirect members (being any person or entity who indirectly holds at least a 15% interest in the bidder other than in the context of shares listed on a recognised stock exchange), directors or members of senior management, whether in respect of CSIR or any other government organ or entity and whether from the Republic of South Africa or otherwise ("Government Entity")

a. engages in any collusive tendering, anti-competitive conduct, or any other similar conduct, including but not limited to any collusion with any other bidder in respect of the subject matter of this bid;

b. seeks any assistance, other than assistance officially provided by a Government Entity, from any employee, advisor or other representative of a Government Entity in order to obtain any unlawful advantage in relation to procurement or services provided or to be provided to a Government Entity;

c. makes or offers any gift, gratuity, anything of any value or other inducement, to any Government Entity's officers, directors, employees, advisors or other representatives in order to obtain any unlawful advantage in relation to procurement or services provided or to be provided to a Government Entity;

d. accepts anything of value or an inducement that would or may provide financial gain, advantage or benefit in relation to procurement or services provided or to be provided to a Government Entity;

e. pays or agrees to pay to any person any fee, commission, percentage, brokerage fee, gift or any other consideration, that is contingent upon or results from, the award of any tender, contract, right or entitlement which is in any way related to procurement or the rendering of any services to a Government Entity;

f. has in the past engaged in any matter referred to above; or

g. has been found guilty in a court of law on charges of fraud and/or forgery, regardless of whether or not a prison term was imposed and despite such bidder, member or director's name not specifically appearing on the List of Tender Defaulters kept at National Treasury.

16 MISREPRESENTATION DURING THE LIFECYCLE OF THE CONTRACT

16.1 The bidder should note that the terms of its Tender will be incorporated in the proposed contract by reference and that the CSIR relies upon the bidder's Tender as a material representation in making an award to a successful bidder and in concluding an agreement with the bidder.

16.2 It follows therefore that misrepresentations in a Tender may give rise to service termination and a claim by the CSIR against the bidder notwithstanding the conclusion of the Service Level Agreement between the CSIR and the bidder for the provision of the Service in question. In the event of a conflict between the bidder's proposal and the Service Level Agreement concluded between the parties, the Service Level Agreement will prevail.

17 PREPARATION COSTS AND LIMITATION OF LIABILITY

The Bidder will bear all its costs in preparing, submitting and presenting any response or Tender to this bid and all other costs incurred by it throughout the bid process. Furthermore, no statement in this bid will be construed as placing the CSIR, its employees or agents under any obligation whatsoever, including in respect of costs, expenses or losses incurred by the bidder(s) in the preparation of their response to this bid.

A bidder participates in this bid process entirely at its own risk and cost. The CSIR shall not be liable to compensate a bidder on any grounds whatsoever for any costs incurred or any damages suffered as a result of the Bidder's participation in this Bid process.

18 INDEMNITY

If a bidder breaches the conditions of this bid and, as a result of that breach, the CSIR incurs costs or damages (including, without limitation, the cost of any investigations, procedural impairment, repetition of all or part of the bid process and/or enforcement of intellectual property rights or confidentiality obligations), then the bidder indemnifies and holds the

CSIR harmless from any and all such costs which the CSIR may incur and for any damages or losses the CSIR may suffer.

19 PRECEDENCE

This document will prevail over any information provided during any briefing session whether oral or written, unless such written information provided, expressly amends this document by reference.

20 TAX COMPLIANCE

No tender shall be awarded to a bidder who is not tax compliant. If a recommended bidder is not tax complaint, the bidder will be notified in writing of their non- compliant status and the bidder will be requested to submit written proof from SARS of their tax compliant status or proof that they have made an arrangement to meet their outstanding tax obligations within seven (7) working days. Should they fail to do so CSIR will reject their bid.

The CSIR reserves the right to withdraw an award made, or cancel a contract concluded with a successful bidder in the event that it is established that such bidder was in fact not tax compliant at the time of the award or has submitted a fraudulent Tax Clearance Certificate to the CSIR, or whose verification against the Central Supplier Database (CSD) proves non-compliant. The CSIR further reserves the right to cancel a contract with a successful bidder in the event that such bidder does not remain tax compliant for the full term of the contract.

21 TENDER DEFAULTERS AND RESTRICTED SUPPLIERS

No tender shall be awarded to a bidder whose name (or any of its members, directors, partners or trustees) appear on the Register of Tender Defaulters kept by National Treasury, or who have been placed on National Treasury's List of Restricted Suppliers. The CSIR reserves the right to withdraw an award, or cancel a contract concluded with a Bidder should it be established, at any time, that a bidder has been blacklisted with National Treasury by another government institution.

22 GOVERNING LAW

South African law governs this bid and the bid response process. The bidder agrees to submit to the exclusive jurisdiction of the South African courts in any dispute of any kind

that may arise out of or in connection with the subject matter of this bid, the bid itself and all processes associated with the bid.

23 CONFIDENTIALITY

Except as may be required by operation of law, by a court or by a regulatory authority having appropriate jurisdiction, no information contained in or relating to this bid or a bidder's tender(s) will be disclosed by any bidder or other person not officially involved with the CSIR's examination and evaluation of a Tender.

No part of the bid may be distributed, reproduced, stored or transmitted, in any form or by any means, electronic, photocopying, recording or otherwise, in whole or in part except for the purpose of preparing a Tender. This bid and any other documents supplied by the CSIR remain proprietary to the CSIR and must be promptly returned to the CSIR upon request together with all copies, electronic versions, excerpts or summaries thereof or work derived there from.

Throughout this bid process and thereafter, bidder(s) must secure the CSIR's written approval prior to the release of any information that pertains to
(i) the potential work or activities to which this bid relates; or
(ii) the process which follows this bid. Failure to adhere to this requirement may result in disqualification from the bid process and civil action.

24 AVAILABILITY OF FUNDS

Should funds no longer be available to pay for the execution of the responsibilities of this bid, the CSIR may terminate the Agreement at its own discretion or temporarily suspend all or part of the services by notice to the successful bidder who shall immediately make arrangements to stop the performance of the services and minimize further expenditure: Provided that the successful bidder shall thereupon be entitled to payment in full for the services delivered, up to the date of cancellation or suspension.

25 PERSONAL INFORMATION

25.1 Each Party consents to the other Party holding and processing "personal information" (as defined in the POPI Act) relating to it for legal, personnel, administrative and management purposes (including, if applicable, any "special personal information" relating to him/her, as defined in the POPI Act). Notwithstanding the generality of the aforesaid, each Party hereby

undertakes to comply with all relevant provisions of the POPI Act and any other applicable data protection laws. The bidder further agrees to comply with all CSIR's reasonable internal governance requirements pertaining to data protection.

25.2 Each Party consents to the other Party making such information available to those who provide products or services to such parties (such as advisers, regulatory authorities, governmental or quasi-governmental organisations and potential purchasers of such Party or any part of their business).

25.3 While performing any activity where a Party is handling personal information as a "responsible party" (as defined in the POPI Act), each Party undertakes that it will process the personal information strictly in accordance with the terms of the POPI Act, this Contract, and the other Party's instructions from time to time, and take appropriate operational measures to safeguard the data against any unauthorised access.

25.4 Each Party acknowledges that in the course of conducting business with each other, each Party intends to maintain and process personal information about the other Party in an internal database. By signing this Contract, each Party consents to the maintenance and processing of such personal information.

Where relevant, the bidder shall procure that all of its personnel, agents, representatives, contractors, sub-contractors and mandataries shall comply with the provisions of this clause 30 (Personal Information). The CSIR shall be entitled on reasonable notice to conduct an inspection or audit bidders compliance with the requisite POPI Act safeguards.

26 DISCLAIMER

This RFP is a request for proposals only and not an offer document. Answers to this RFP must not be construed as acceptance of an offer or imply the existence of a contract between the parties. By submission of its proposal, bidders shall be deemed to have satisfied themselves with and to have accepted all Terms & Conditions of this RFP. The CSIR makes no representation, warranty, assurance, guarantee or endorsements to bidder concerning the RFP, whether with regard to its accuracy, completeness or otherwise and the CSIR shall have no liability towards the bidder or any other party in connection therewith.

SECTION B

EVALUATION METHODOLOGY

27 TERMS OF REFERENCE

This RFP is For Provision of 11kV Switch Room Upgrade at CSIR Scientia, Pretoria. The service offering must include all requirements as set out in **Annexure B**.

28 EVALUATION CRITERIA

The CSIR has set minimum standards that a bidder needs to meet in order to be evaluated and selected as a successful bidder. The minimum standards consist of the following:

Elimination Criteria (Phase 1)	**Technical Evaluation Criteria (Phase 2)**	**Price and Preference Points Evaluation (Phase 3)**	**Objective Criteria**
Only bidders that comply with ALL the criteria set on paragraph 28.1 on **Phase 1** below will proceed to Technical/Functional Evaluation (Phase 2).	Bidder(s) are required to achieve a predetermined minimum threshold on each of the individual criteria, and a predetermined minimum threshold on 100 points overall. Only bidder (s) who met and/or exceeded the minimum threshold points on **Phase 2** below will proceed to Price and Preference Points Evaluation. (Phase 3)	Bidder(s) will be evaluated out of **100 points** i.e. **80 points** for Price and **20 points** for Preference Points.	The CSIR reserves the right to award this tender to a bidder that did not score the highest total number of points in accordance with Section (2) (1) (f) of the PPPFA (Act 5 of 2000).

28.1 Elimination Criteria (Phase 1)

Proposals will be eliminated under the following conditions:

- Bidder that submitted late bids will not be considered.
- Bidder that submitted to the incorrect location or email address will not be considered (Only electronic submission to **tender@csir.co.za** would be considered).
- Bidder that is listed on the NT database of restricted suppliers and Register of Tender Defaulters will not be considered.

- Bidder that did not quote as per the technical specifications (AB Schedules) and design will not be considered.
- Bidder that fail to attend compulsory site briefing.
- Bidder that did not submit mandatory returnable documents as listed on **Annexure E: Proposal Form and List of Returnable Documents (Mandatory Returnable Documents Table).**

28.2 Technical Evaluation Criteria (Phase 2)

The evaluation of the functional / technical detail of the proposal will be based on the following criteria:

No	ELEMENT	WEIGHT
1	**Applicant's Expertise and Resources** - Construction Manager - Electrical Engineer - Installation Technician/Electrician - Construction Safety Officer	**50** 10 20 10 10
2	**Relevant Company Experience**	**20**
3	**Methodology Statement** - Method statement - Health and SHE safety plan - Project program	**30** 10 10 10
TOTAL (%)		**100**

Proposals with functionality / technical points of less than the pre-determined minimum overall percentage of 70**%** and less than 50**%** on each of the individual sub-criteria will be eliminated from further evaluation on Price and Preference Points Evaluation.

Refer to **Annexure C** (**Technical Evaluation Matrix/Rubrics)** for the scoring ranges/rubrics that will be used to evaluate functionality**.**

28.3 Price and Preference Points Evaluation (Phase 3)

Only Bidders that have met minimum thresholds on Technical/functional Evaluation will be evaluated for price and preference points. Price and Preference Points will be evaluated as per **Annexure G**: Preference Points Award Form.

29 CONSTRUCTION INDUSTRY DEVELOPMENT BOARD (CIDB)

29.1 Only those tenderers who are registered with the CIDB or are capable of being so prior to the closing date and time of this RFQ submissions, with a grading of **7EP or higher** class of construction works, will be considered.

29.2 Joint ventures are eligible to **submit** proposals provided that:

- Every member of the joint venture is registered with the CIDB;
- The lead partner has a contractor grading designation in the **7EP or higher** class of construction work; or not lower than one level below the required grading designation in the class of works construction works under consideration and possess the required recognition status;
- The combined contractor grading designation calculated in accordance with the Construction Industry Development Regulations is equal to **7EP or higher** class of construction work.

29.3 Minimum Contract Skills Development Goal (CSDG)

- The contractor shall achieve in the performance of the Contract the Contract Skills Development Goal (CSDG) established in the CIDB Standard for Developing Skills through Infrastructure Contracts, published in Gazette Notice No. 48495 of 28 April 2023.

29.4 Tender Data

- The conditions of tender are the Standard Conditions of Tender as contained in Annex C of Board Notice 423 of 2019 in Government Gazette No. 42622 of 08 August 2019, Construction Industry Development Board (CIDB) Standard for Uniformity in Construction Procurement. (See www.cidb.org.za) which are reproduced without amendment or alteration for the convenience of tenderers as an Annex to this Tender Data.
- The Standard Conditions of Tender make several references to the Tender Data for details that apply specifically to this tender. The Tender Data shall have precedence in

the interpretation of any ambiguity or inconsistency between it and the standard conditions of tender. Each item of data given below is cross-referenced to the clause in the Standard Conditions of Tender to which it mainly applies.

30 OBJECTIVE CRITERIA

The CSIR reserves the right to award this tender to a bidder that did not score the highest total number of points in accordance with Section (2) (1) (f) of the PPPFA (Act 5 of 2000)", under the following conditions:

- The directors, shareholders or officers of the bidder must not be formally charged of fraudulent or illegal conduct which could harm the CSIR's reputation by associating with the bidder.

31 NATIONAL TREASURY CENTRAL SUPPLIER DATABASE (CSD) REGISTRATION

Respondents are required to self-register on National Treasury's Central Supplier Database (CSD) which has been established to centrally administer supplier information for all organs of state and facilitate the verification of certain key supplier information. Business may not be awarded to a Respondent who has failed to register on the CSD. Only foreign suppliers with no local registered entity need not register on the CSD. In order to enable the CSIR to verify information on the CSD, Respondents are required to provide the unique registration reference number.

Before any negotiations will start with the winning bidder it will be required from the winning bidder to:

- be registered on National Treasury's Central Supplier Database (CSD). Registrations can be completed online at: www.csd.gov.za;
  provide the CSIR of their CSD registration number.

Annexure A

Standard Bidding Document (SBD) 1

PART A: INVITATION TO BID

YOU ARE HEREBY INVITED TO BID FOR THE CSIR 11KV SWITCHGEAR REPLACEMENT					
BID NUMBER:	CSIR RFP No. 3702/17/10/2025	CLOSING DATE:	17 October 2025	CLOSING TIME:	16:30
DESCRIPTION	For the provision of 11Kv Switch Room Upgrade at the CSIR Scientia, Pretoria				

BID RESPONSE DOCUMENTS MAY BE DEPOSITED IN THE BID BOX SITUATED AT *(STREET ADDRESS)*

The CSIR requires that all tender submissions be submitted electronically to tender@csir.co.za. Should tender file size exceed 25MB, bidders submit tender in multiple emails. Use the tender number CSIR RFP No. 3702/17/10/2025 and description of the tender as the subject on your email.

BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO		**TECHNICAL ENQUIRIES MAY BE DIRECTED TO:**	
CONTACT PERSON		CONTACT PERSON	
TELEPHONE NUMBER		TELEPHONE NUMBER	
FACSIMILE NUMBER		FACSIMILE NUMBER	
E-MAIL ADDRESS	tender@csir.co.za	E-MAIL ADDRESS	tender@csir.co.za

SUPPLIER INFORMATION				
NAME OF BIDDER				
POSTAL ADDRESS				
STREET ADDRESS				
TELEPHONE NUMBER	CODE		NUMBER	
CELLPHONE NUMBER				
FACSIMILE NUMBER	CODE		NUMBER	
E-MAIL ADDRESS				
VAT REGISTRATION NUMBER				
SUPPLIER COMPLIANCE STATUS	TAX COMPLIANCE SYSTEM PIN:		**OR** CENTRAL SUPPLIER DATABASE No:	MAAA
1 ARE YOU THE ACCREDITED REPRESENTATIVE IN SOUTH AFRICA FOR THE GOODS /SERVICES /WORKS OFFERED?	☐Yes ☐No [IF YES ENCLOSE PROOF]		**2** ARE YOU A FOREIGN BASED SUPPLIER FOR **THE GOODS /SERVICES /WORKS OFFERED?**	☐Yes ☐No [IF YES, ANSWER THE QUESTIONNAIRE BELOW]

QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS	
IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)?	☐ YES ☐ NO
DOES THE ENTITY HAVE A BRANCH IN THE RSA?	☐ YES ☐ NO

DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA?	☐ YES ☐ NO
DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA?	☐ YES ☐ NO
IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION?	☐ YES ☐ NO

IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 BELOW.

PART B: TERMS AND CONDITIONS FOR BIDDING

1. BID SUBMISSION:

1.1. BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.

1.2. **ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED–(NOT TO BE RE-TYPED) OR IN THE MANNER PRESCRIBED IN THE BID DOCUMENT.**

1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT, 2000 AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2022, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.

2. TAX COMPLIANCE REQUIREMENTS

2.1 BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.

2.2 BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VERIFY THE TAXPAYER'S PROFILE AND TAX STATUS.

2.3 APPLICATION FOR TAX COMPLIANCE STATUS (TCS) PIN MAY BE MADE VIA E-FILING THROUGH THE SARS WEBSITE WWW.SARS.GOV.ZA.

2.4 BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.

2.5 IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.

2.6 WHERE NO TCS PIN IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.

2.7 NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE, COMPANIES WITH DIRECTORS WHO ARE PERSONS IN THE SERVICE OF THE STATE, OR CLOSE CORPORATIONS WITH MEMBERS PERSONS IN THE SERVICE OF THE STATE."

NB: FAILURE TO PROVIDE / OR COMPLY WITH ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.

SIGNATURE OF BIDDER: ……

CAPACITY UNDER WHICH THIS BID IS SIGNED: ……

(Proof of authority must be submitted e.g. company resolution)

DATE: ……...

Annexure B

For the Provision of 11kV Switch Room Upgrade at CSIR Scientia, Pretoria

CSIR RFP No. 3702/17/10/2025

1. INVITATION FOR PROPOSAL

Proposals are hereby invited for the provision of 11kV Switch Room upgrade at CSIR Scientia, Pretoria.

The purpose of the Request for Proposal (RFP) is to obtain capability, pricing and general information on the business of potential Contractors for the CSIR to determine the Contractors most capable of providing the service.

This RFP document details and incorporates, as far as possible, the tasks and responsibilities of the potential bidder required by the CSIR.

This RFP does not constitute an offer to do business with the CSIR but merely serves as an invitation to bidder(s) to facilitate a requirements-based decision process.

Responses to this Request for Proposal (RFP) (hereinafter referred to as a Bid or a Proposal) are requested from suitably qualified entities (hereinafter referred to as a Respondent or Bidder) for the CSIR 11kV SWITCHROOM UPGRADE.

2. PROPOSAL REQUIREMENTS

All proposals are to be submitted in a format specified in this enquiry However, bidders are welcome to submit additional / alternative proposals over and above the originally specified format.

2.1. Technical Proposal

The following must be submitted as part of the **technical** proposal:

a. CV of the Construction Manager with relevant certificates
b. CV of the Electrical Engineer with relevant certificates
c. CV of the Installation Technician/Electrician with relevant certificates
d. CV of the Construction Safety Officer with SACPCMP (CHSO) registration
e. Company completion certificates or completion letters of switchgear/switch room projects of similar size and value (7EP).

f. Method statement
g. SHE plan, policy and risk assessment
h. Technical AB Schedules (Refer to C3.6)
i. Proof of Company Registration
j. Registration with the CIDB in the category **7EP** or higher

2.2. Financial Proposal:

The following must be submitted as part of the **financial** proposal:

a. Cover Letter.
b. Completed Pricing Schedule (**Annexure D**) or Quotation on official company letterhead aligned to the detailed pricing schedule
c. CSD registration report (RSA suppliers only).
d. Valid BBBEE Certificate

2.3. Minimum Contract Skill Development Goal (CSDG)"

The following are documents required for minimum Contract Skills Development Goal (CSDG)" and are **non-returnable** with the proposal, only submitted upon request:

a. Baseline Training Plan
b. Supervisor Agreement
c. Interim Compliance Training Report
d. Final Training Report

3. PROPOSAL SPECIFICATION

3.1. Scope of Work

C3.1.1. Employers Objectives

The Council for Scientific and Industrial Research, commonly known as the CSIR, is a world-class African research and development organisation established through an Act of Parliament in 1945. The CSIR undertakes directed, multidisciplinary research and technological innovation that contributes to the improved quality of life of South Africans.

CSIR is one of the leading scientific research and technology development organisations in Africa. In partnership with national and international research and technology institutions, the CSIR undertakes directed and multidisciplinary research and technology innovation that contributes to the improvement of the quality of life of South Africans. The

CSIR's main site is in Pretoria while it is represented in other provinces of South Africa through regional offices.

Recognizing the imperative to sustain operational efficiency and address end-of-life equipment concerns, CSIR has taken a proactive step to replace existing electrical infrastructure within the Scientia campus to ensure that the Campus maintains resilient in achieving its service delivery to the various research facilities within the CSIR. This infrastructure replacement will be executed in various phases in the short term.

C3.1.2. Overview of the Works

This phase of the project will include the 11kV SWITCHROOM UPGRADE, related ancillary equipment and building alteration.

C3.1.3. Scope of the Works

The Supply, installation, testing and commissioning of a new 11kV switchboard and related control and measurement systems at the 11kV Switch room will be inclusive of the SCADA system for enhanced monitoring and control of panels, implementation of overcurrent, earth fault and arc protection and the installation of new AC/DC panel, battery cabinet and battery charger. Additionally, it will include the moving of the capacitor bank with controls, removing existing obsolete equipment and completing building alternations (Civil and Electrical related).

The high-level scope of works but not limited to is as follows:

- Install new 11kV switchgear for the control room consisting of 2 incomers, 1 bus section and 16 feeders with space for future feeders
- Implementation of a SCADA system for enhanced monitoring and control of panels. (This must be priced and will be determined by the client upon award if it is included as part of this contract scope).
- Install new AC/DC panel
- Install battery charger and install new batteries in the switch room.
- Re-configuration of the existing room that includes building works, repositioning of capacitor banks and related building services necessary to accommodate new board orientation. The building approval is to include the attached structure to the switch room. Refer to Architect drawing no. P2501_ARCH_300_01 for layout for switch room and attached building dimensions.

- Replacement of building 26 Local transformer and panels with a suitable outdoor type B minisub.
- Dismantle existing equipment
- Installation of operator's desk with remote control switches
- Re-arranging of the cameras, fire monitoring within room.
- Installation of new cameras and fire monitoring sensors where required.
- Refurbishment and painting of entire switch room and including the floors.
- Lighting installation
- Post Maintenance Service as per the BOQ

C3.1.4. Location of the Works

CSIR main site, Meiring Naude Road, Pretoria – GPS Coordinates:

C3.2. ENGINEERING

C3.2.1. Employer's Design

The permanent works included in this contract has been designed by the Employer with exception of the MV Switch Board, SCADA system, Battery Charger/Bank and bay integration which the contractor shall price and allow for design of. The detail of the works

is indicated on the drawings and in the specifications. The Tenderer may submit alternative offers for designs prepared by himself subject to the conditions specified in the Contract Data.

C3.2.2. Drawings

Construction drawings will be issued in electronic format (PDF format). Only digitally signed drawings of which the signature is certified by SigniFlow will be accepted as official construction drawings. Construction drawings will be issued by means of an electronic issue list which will record the latest version of the drawing issued and the issue date. The Contractor shall sign the issue list and return the signed issue list to the Engineer to confirm that the drawings have been received. The latest version of the drawing issued shall be applicable from the date of issue.

One A3 set of paper prints of the construction drawings will be made available to the Contractor on or before the handing over of Site for information purposes only. No further paper copies will be issued to the Contractor. The onus will be on the Contractor to ensure that paper copies of the latest issued electronic format construction drawings are available on Site for construction purposes.

The Employers Agent will maintain a set of paper copies of all issued drawings on Site for the recording of As Built information.

C3.3. PROCUREMENT

C3.3.1. Procurement Principles

The CSIR decided to adopt the Standard of Uniformity in Construction Procurement published by the Construction Industry Development Board (CIDB) for their procurement process.

The Standard for Uniformity in Construction Procurement establishes minimum requirements that:

- promote cost efficiencies through the adoption of a uniform structure for procurement documents, standard component documents and generic solicitation procedures;
- provide transparent, fair and equitable procurement methods and procedures in critical areas in the solicitation process;

- ensure that the forms of contract that are used are fair and equitable for all the parties to a contract; and
- enable risk, responsibilities and obligations to be clearly identified.

The conditions of tender are the Standard Conditions of Tender as contained in Annex C of Board Notice 423 of 2019 in Government Gazette No. 42622 of 08 August 2019, Construction Industry Development Board (CIDB) Standard for Uniformity in Construction Procurement. (See www.cidb.org.za) which are reproduced without amendment or alteration for the convenience of tenderers as an Annex to this Tender Data.

The Standard Conditions of Tender make several references to the Tender Data for details that apply specifically to this tender. The Tender Data shall have precedence in the interpretation of any ambiguity or inconsistency between nit and the standard conditions of tender. Each item of data given below is cross-referenced to the clause in the Standard Conditions of Tender to which it mainly applies

The contractor shall achieve in the performance of the Contract the Contract Skills Development Goal (CSDG) established in the cidb Standard for Developing Skills through Infrastructure Contracts, published in Gazette Notice No. 48495 of 28 April 2023.

C3.3.2. Labour Intensive Construction

Labour Intensive Construction shall mean the economically efficient employment of as great a portion of labour as is technically feasible to produce a standard of construction as demanded by the Specifications with completion by the Due Completion Date, thus the effective substitution of labour for equipment.

Appropriate portions of the Works included in the Contract shall be executed using labour intensive construction methods. These portions of the Works shall be constructed utilising only locally employed labour and/or the labour of local sub-contractors, supplemented to the extent necessary and unavoidable by the Contractors key personnel as provided for in clause C3.3.2, unless otherwise instructed by the Engineer. The portions of the Works to be executed using labour intensive construction methods are:

- Painting and building related works.
- clearing and grubbing of the Site;

- bedding, selected fill, backfilling and compaction of all cable trenches irrespective of depth, but assisted by mechanical compaction equipment in order to achieve the specified densities;
- transportation and spoiling of all trench materials, where the disposal site is located within 20 metres of source;
- dismantling and re-erection of fences; and
- cleaning and tidying up of the Site.

In respect of those portions of works which are not listed above, the construction methods adopted and plant utilised shall be at the discretion of the Contractor, provided always that the construction methods adopted and plant utilised by the Contractor are appropriate in respect of the nature of the Works to be executed and the standards to be achieved in terms of the Contract.

C3.3.3. Subcontracting

The Contractor shall appoint such authorities and/or specialist subcontractors and suppliers as may be designated or nominated by the Employer or the Engineer for those portions of the Works specified in the Scope of Works.

As required by the Conditions of Contract, the Contractor shall be responsible for all work carried out by sub-contractors (whether nominated by the Employer or selected by the Contractor) on his behalf. The Engineer will not liaise directly with any such sub-contractor, nor will he become involved in any problems and/or disputes related to payments, programming, workmanship, etc, unless provided for in the Conditions of Contract. Such problems and/or disputes shall remain the sole concern of the Contractor and his sub-contractors.

C3.4. CONSTRUCTION

C3.4.1. Standard Specifications

The Standard Specifications on which this contract is based are the South African Bureau of Standard's Standardized Specifications for Civil Engineering Construction (SABS 1200). (Note: "SABS has been changed to "SANS"; the SABS 1200 specifications are due to be replaced in the foreseeable future by SANS 2001 amongst other specifications).

Although not bound in nor issued with this Document, the relevant sections of the standard specifications shall form part of this Contract. These documents are available at the

Contractor's expense from the SA Bureau of Standards, Private Bag X191, PRETORIA, 0001.

The applicable SABS 1200 Standardised Specification for this Contract shall be the following:

- A - General
- AA - General (small works)
- AB - Engineers office
- AH - General (structural)
- DB - Earth Work for trenches
- C - Site clearance
- G - Concrete (structural)
- GA - Concrete (small works)
- GB - Concrete (ordinary buildings)
- GE - Precast concrete
- HA - Structural steelwork (sundry items)
- HB - Cladding and sheeting
- HC - Corrosion protection of structural steelwork
- LB - Bedding (pipes)
- LC - Cable ducts

Particular specification of this contract is extended from C3.4.3 to C3.5 which C3.6 being the Technical returnable AB Schedule.

The various documents listed in section C3.4.1 shall be treated as mutually explanatory. However, should any requirement of section C3.4.2 conflict with any requirement of the Standardised Specifications or with any requirement of the Particular Specifications, then the requirement of section C3.4.3 to C3.6 shall prevail.

C3.4.2. VARIATIONS AND ADDITIONAL CLAUSES TO THE STANDARD AND PARTICULAR SPECIFICATIONS

The following variations and additions to the Standard and Particular Specifications will be applicable to this Contract:

Document No.	Description
SANS 1200	Civil Engineering Construction (all relevant parts)
SANS 10400	Application of National Building Regulations (all relevant parts)
SANS 10109-2	Finishes to concrete floors
SANS 10142-1	Wiring of premises Part 1
SANS 10142-2	Wiring of premises Part 2
10114 –1	Interior Lighting
SANS 10139	Primary standard for fire detection
SANS 10021	Waterproofing of buildings
SANS 1029	Miniature substations
SANS 1507	Electric cables with extruded solid dielectric insulation for fixed installations (300 / 500 V to 1900/ 3300 V)
SANS 1411	Materials of insulated electric cables and flexible cords.
SANS 60694	Common specifications for HV switchgear and Control gear standards
SANS 62711	Part 100 – High voltage alternating current circuit breakers
SANS 62271-200	AC metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV
SANS 62271-100	Alternating-current circuit-breakers
SANS 1574	Electric flexible cores, cords and cables with solid extruded dielectric insulation
SANS 60227	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V
SANS 1885 ANNEX A	Rules for application of standard wire numbering
SANS 1652	Battery chargers (not attached)
SANS 1632	Batteries parts 2 & 3(not attached)
SANS 1019	Standard voltages, currents and insulation levels for electricity supply
SANS IEC 60529	Degrees of protection provided by enclosures (IP code)
SANS IEC 60793	Optical fibres

SANS IEC 60794	Optical fibre cables
SANS IEC 61000	Electromagnetic compatibility (EMC)
SANS 61073-1	Splices for optical fibres and cables
SANS IEC 61131	Programmable controllers - All parts
NRS 037-1 2006:	Telecontrol protocol Part 1: Telecontrol protocol for stand-alone remote terminal units
BS 4579-1	The performance of mechanical and compression joints in electric cable and wire connectors
BS 9520	Electrical connectors of assessed quality for DC and low frequency application: generic data, methods of test and capability approval procedures
IEC 60255	Electrical relays - Part 3 to 25
IEC 60870-5-101	Tele-control equipment and systems – Part 5: Transmission protocols – Section 101: Companion standard for basic Telecontrol tasks
IEC 60870-5-103	Tele-control equipment and systems – Part 5-103: Transmission protocols – Companion standard for the informative interface of protection equipment
SANS 121:2011	Hot dip galvanized coatings on fabricated iron and steel articles.
IEC 61274	Fibre optic adaptors
IEC 61850	Communication networks and systems in substations
IEC 62063	The use of electronic and associated technologies in auxiliary equipment of switchgear and control gear
SANS 1339	Cross-linked polyethylene (XLPE) insulated cables for rated voltages 3,8/6,6 kV to 19/33 kV
SANS 97	Impregnated paper insulated metal-sheathed cables for rated voltages 3,3/3,3 kV to 19/33 kV (excluding pressure assisted cables)
SANS 10198	The selection, handling and installation of electric power cables of rating not exceeding 33 kV (all parts)
OHSA	The Occupational Health and Safety Act 85 of 1993
ISO 9001	ISO 9001 Model to Quality Assurance in Design Development, Production, Installation and Services.

The relevant regulations of the City of Tshwane and the CSIR.

PSA GENERAL

PSA1 QUALITY (Clause 3.1)

All material used in the Works shall, where such mark has been awarded for a specific type of material, bear the SABS mark. Alternatively, the Contractor shall furnish the Engineer with certificates of compliance of materials, which bear the official mark of the appropriate standard.

PSA2 PLANT (Clause 4.3)

Except where the use of plant is essential in order to meet the specified requirements by the Due Completion Date, the Contractor shall use only hand tools and equipment in the construction of those portion(s) of the Works that are required in terms of the Scope of Works to be constructed using labour intensive construction methods.

PSA3 SITE FACILITIES

PSA3.1 SITE FACILITIES AVAILABLE

PSA3.1.1 Contractor's Camp

A Site will be made available by the Employer for the Contractor's camp and depot adjacent to the site. The exact location of the site should be request from the Engineer prior to the contractor establishing site.

PSA3.1.2 Source of Water Supply

The Contractor shall be responsible under the Contract for the supply and distribution at his cost of all water that he may require for purposes of constructing the Works. Accordingly, the Contractor shall pay all connection fees and consumption charges, and at his cost provide all connections, consumption meters, pipework, storage tanks, transport and other items associated with the supply of water for the Works.

Should water be supplied by the water utility, The Contractor shall, subject to the approval of the Engineer, make any necessary arrangements with the water utility for the connection(s), and shall

provide in his tender for the payment of all charges and costs that are associated with making water available for purposes of constructing the Works.

PSA3.1.3 Source of Power Supply

The Contractor shall be responsible under the Contract for the supply and distribution at his cost of all electricity that he may require for purposes of constructing the Works. Should an electricity connection be available, the contractor will be required to install a prepaid meter to measure the power utilised in kwh per month. These electricity costs will be offset from the contractors payment certificate.

Should electricity be supplied by the power utility, The Contractor shall, subject to the approval of the Engineer, make any necessary arrangements with the power utility for the connection(s), and shall provide in his tender for the payment of all charges and costs that are associated with making electricity available for purposes of constructing the Works.

PSA3.1.4 Housing

The Contractor shall be permitted to house Key Personnel only within his camp site(s). At the commencement of the Contract, the Contractor shall inform the Engineer of his intentions regarding the housing of Key Personnel on Site, and he shall thereafter ensure that all such accommodation is kept neat and tidy, hygienic and properly controlled at all times. Should at any stage of the Contract the Employer and/or the Engineer be of the opinion that the housing of Key Personnel within the camp site(s) of the Contractor is causing disturbance or inconvenience to the landowner or the Employer, then the authority granted by this clause for the Contractor to house Key Personnel on Site may be withdrawn, either partially or entirely.

The Contractor shall at all times conform to all requirements contained in law or bylaws, as well any other requirements set by the controlling local authority.

PSA3.2 SITE FACILITIES REQUIRED

PSA3.2.1 For the Contractor

Whatever may be required for the satisfactory execution of the Contract as set out in Schedule 8.3.2 – Bill of Quantities.

3.2.1.1. NAME BOARDS (Clause 3.1)

A name board conforming to the standard requirements of the South African Association of Consulting Engineers must be provided and erected on site, details to be provided by the Engineer.

3.2.1.2. OFFICE BUILDING (Clause 3.2 and Clause 5.2)

The Contractor shall provide Office accommodation, meeting facility, ablution facilities for male and female, carports, cleaning and maintenance, as well as 24-hour security for the office for the duration of the contract period. The Contractor shall provide insurance for the above-mentioned period for the buildings as well as the contents of the buildings at the replacement cost for new buildings and contents.

PSA3.2.2 For the Engineer

As specified under Section PSA.

PSA3.2.3 Sanitary facilities

Male and female Flush toilets or Chemical toilets shall be provided and maintained for the use of the Contractor's personnel at all camp sites that the Contractor may establish for construction of the Works. In addition, the Contractor shall at all times during construction of the Works provide adequate sanitary facilities on site so that all employees are at all times within easy reach of sanitary facilities. The flush toilets or chemical toilet facilitates for male and female is to be provided for every 100m radius.

PSA4 ADJUSTMENT OF PRELIMINARY AND GENERAL TIME-RELATED ITEMS (Clause 8.2.2)

PSA4.1 Replace the note on the end of the clause with the following:

Note: An approved extension of time shall not necessarily qualify the Contractor to receive additional payment for each relevant time related item at the original tendered unit rate for such item. Should the Engineer grant extension of time with additional payment, the additional payment will be calculated pro rata to the extension of time in relation to the time for achieving Practical Completion for the Works at the date when the agreement came into effect.

PSA4.2 Should the Time for Completion be automatically extended due to abnormal weather conditions occurring during execution of the Contract as provided for in the Conditions of Contract,

adjustment to the total for time-related preliminary and general items will be applicable as specified in Clause PSA4.1.

PSA5 HEALTH AND SAFETY

The maintenance of safe work practice at all times and in all sections of the execution of the works is embedded in the day-to-day site activities of all the Contractor's management, staff and workforce on the contract.

The introduction of the Construction Regulations in 2003 requires from the Employer to ensure that the Contractor has made adequate provision for the execution of the works within the specifications of said regulations. The contractor shall comply to the Health and Safety Specification bound into section C3.4.3 of this document.

It must be noted that the lists below are not exhaustive and that many items have been traditionally priced by the Contractor as an integral part of his Preliminary and General items or as part of the overhead costs of other items. The tender document, although not detailed with regards the Construction Regulations, requires that the Contractor ensures adherence to the Occupational Health and Safety Act (Act 85 of 1993) the Construction Regulations, 2014.

PSA5.1 Fixed-charge Items

Add the following new Clause (Clause 8.3.5):	Unit
Compliance with the Occupational Health and Safety Act (Act 85 of 1993) and its regulations and with the Employer's Health and Safety Specifications.	Sum

The fixed charge item shall include but shall not be limited to the following:

- Preparation of Health and Safety Plan,
- Establishment of Health and Safety File,
- Health and Safety Training
- Personal Protective Clothing and Equipment
- Establishment of Safety Administration
- Signage to demarcate site as a restricted construction area
- Other Health and Safety Fixed-charge Obligations

PSA5.2 Time-related Items

Add the following new Clause (Clause 8.4.6):	Unit
Compliance with the Occupational Health and Safety Act. (Act 85 of 1993) and its regulations and with the Employer's Health and Safety Specifications.	Sum

The time related item shall include but shall not be limited to the following:

- The employment cost of all health and safety personnel including consultants, health and safety officers, inspectors, supervisors and issuers required in terms of the Contractor's Health and Safety Plan,
- Updating the Health and Safety Plan as needed,
- Carrying out of periodic own audits and follow-up audits,
- Compiling ongoing risk assessments and risk assessment reports as required by the Works,
- Convening of regular safety meetings with the Safety Representatives,
- Accompanying and supporting the Employer or his Safety Agent during ad hoc audits,
- Compilation of monthly safety reports and statistics for the Employer or his Safety Agent,
- Implementation and maintenance of Training
- Maintenance of personal protective clothing and equipment
- Maintenance of fences, signs and barricades
- Access control to construction site
- Implementation and maintenance of safety administration
- Other Health and Safety Time-related Obligations
- Performance Guarantees.

PSA6 ENVIRONMENTAL MANAGEMENT PLAN

According to the NEMA regulations, the contractor should comply with the Environmental Authorisation (RoD), the Environmental Management Programme (EMPr) as well as Best Practices. The Contractor shall comply with all the conditions of the Environmental Agents (MDA) requirements as the EMPr is still in process. The contractor is to adhere to environmental control officers requirements.

PSA6.1 FIXED-CHARGE ITEMS

Add the following Clause (Clause 8.3.7):	Unit
Compliance with Environmental Management Plan and Record of Decision	Sum

The sum tendered shall cover all costs, overheads, profits and charges incurred in complying with all the conditions of the Environmental Management Plan and Record of Decision bound into Section C3.5.3.

PSA6.2 TIME-RELATED ITEMS

Add the following Clause (Clause 8.4.8):	Unit
Compliance with Environmental Management Plan and Record of Decision	Sum

The sum tendered shall cover all costs, overheads, profits and charges incurred in complying with all the conditions of the Environmental Management Plan and Record of Decision bound into Section C3.5.3.

PSA7 SUMS STATED PROVISIONALLY (Clause 8.5)

PSA7.1 Contract Price Adjustment

A Provisional Sum shall be included in the Summary of Schedules for Contract Price Adjustment. No percentage mark-up will be applicable to any payments made using contingency money other than the mark up included in prices for variations determined in terms of the Conditions of Contract. The Contract Price Adjustment will only be allowed for the increases relevant to the CPI index applicable to this document.

PSA7.2 Contingencies

A Provisional Sum shall be included in the Summary of Schedules for contingencies. No percentage mark-up will be applicable to any payments made using contingency money other than the mark up included in prices for variations determined in terms of the Conditions of Contract. The Provisional Sum will only be allowed for additional scope of works and is subject to the Engineers approval.

PSA8 Engineers Requirements (Not applicable to this contract)

PSA8.1 Telephone cost

The Engineer's representative will provide his own cellular telephone for the contract.

PSA8.2 Site Office consumables

The provisions for site office consumables are not applicable to this contract.

PSA8.3 Electronic office equipment

The provisions for electronic office equipment are not applicable to this contract.

PSA8.4 Accommodation of the Engineers Representative

The provisions for the engineer's representative accommodation are not applicable to this contract.

PSA8.5 Acceptance Control Testing

The provisions for the acceptance control testing are not applicable to this contract. However, the contractor is to provide test results where relevant on the contractor for the basis of compliance in terms of regulatory requirements and standards.

PSA9 Existing Services

PSA9.1 Cross cut and locating existing services

A Provisional Sum must be included in Schedule 2 for cross cutting and locating of existing services. The contractor is to ensure that the provision sums for the existing services is not exceed. The contractor is to take care when pricing as the provision sum allowance is fixed.

In addition to the abovementioned amount, provision is made in Schedule 2 for a mark-up on the amount to be paid. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in the Conditions of Contract

PSA9.2 Relocating existing services

A Provisional Sum must be included in Schedule 2 for exposing existing services. The contractor is to ensure that the provision sums for the relocating of existing services is not exceeded. The contractor is to take care when pricing as the provision sum allowance is fixed.
In addition to the abovementioned amount, provision is made in Schedule 2 for a mark-up on the amount to be paid. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in the Conditions of Contract

PSA9.3 Facilitation of Wayleave extension

A Provisional Sum must be included in Schedule 2 for Facilitation of all Wayleave extension services. The contractor is to ensure that the provision sums for the relocating of existing services is not exceeded. The contractor is to take care when pricing as the provision sum allowance is fixed.

In addition to the abovementioned amount, provision is made in Schedule 2 for a mark-up on the amount to be paid. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in the Conditions of Contract

PSA9.4 Rehabilitations over affected areas

A Provisional Sum must be included in Schedule 2 for executing of site rehabilitation services. This will include the labour and transport to remove rubble, supply of materials and installation to reinstate infrastructure to original condition where applicable. The contractor is to ensure that the provision sums for the relocating of existing services are not exceeded. The contractor is to take care when pricing as the provision sum allowance is fixed.

In addition to the abovementioned amount, provision is made in Schedule 2 for a mark-up on the amount to be paid. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in the Conditions of Contract.

PSA9.5 Permitting

A Provisional Sum must be included in Schedule 2 for obtaining all necessary permits for transport of equipment and/or giving of notices to any other authority or institute involved, arranging outages, as well as co-operation agreements with other traders/ contractors involved with the project. The contractor is to take care when pricing as the provision sum allowance is fixed.

In addition to the abovementioned amount, provision is made in Schedule 2 for a mark-up on the amount to be paid. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in the Conditions of Contract

PSA9.6 Building Works Certificates

A Provisional Sum must be included in Schedule 2 for sourcing service providers to provide Roofing installation Certificates, Fire control certificates, Glazing certificates, OHS Sign off. etc. and all relevant certifications to achieve building control approval.. The contractor is to take care when pricing as the provision sum allowance is fixed.

In addition to the abovementioned amount, provision is made in Schedule 2 for a mark-up on the amount to be paid. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in the Conditions of Contract.

PSA9.7 PFC Bank Repositioning

A Provisional Sum must be included in Schedule 2 for reposition Capacitor Banks to new location and PFC control panel including all cabling, mounting and as per Layout and including decommissioning, testing and recommissioning. The contractor is to take care when pricing as the provision sum allowance is fixed.

In addition to the abovementioned amount, provision is made in Schedule 2 for a mark-up on the amount to be paid. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in the Conditions of Contract.

PSA9.8 Drawing and Documentation

A Provisional Sum must be included in Schedule 2 for marking-up a full set of drawings to show the exact positions of cables, cable joints, road crossings etc as well as all electrical drawings including protection schematics, key diagrams, manufacturers drawings, cabling diagrams etc for control plant schemes. These "As-Built" drawings must be handed to the engineer at commissioning of the contract and also included in the maintenance manuals to be provided. Electronic copies of all drawings, wiring diagrams, cable schedules shall be handed to the engineer on completion of the project. The contractor is to take care when pricing as the provision sum allowance is fixed.

In addition to the abovementioned amount, provision is made in Schedule 2 for a mark-up on the amount to be paid. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in the Conditions of Contract.

PSA10 Specialist Services

PSA10.1 Specialist training

N/A

PSA10.2 Land Surveyor and Other Services

A Provisional Sum must be included in Schedule 2 for payments to be made to Land Surveyor on the contract or other professional service providers. Payment to the contractor will be based on invoices certified by the Engineer and issued by specialist to the Contractor for work undertaken in terms of this item.

PSA10.3 Temporary Electricity Meter

A Provisional Sum must be included in Schedule 2 for payments for the supply and installation of a temporary 3-phase electricity meter for the duration of the contract and issuing of a COC for the installation.

In addition to the above amount, provision is made in Schedule 2 for a mark-up on any payments made by the Contractor in this regard. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in the Conditions of Contract.

PSA10.4 Switch Room Roofing

A Provisional Sum must be included in Schedule 2 for payments on roof inspection and supply and installation of materials required to attend to any roofing impairments and to ensure no leaks are present and a roofing certificate compliance can be obtained.

In addition to the above amount, provision is made in Schedule 2 for a mark-up on any payments made by the Contractor in this regard. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in the Conditions of Contract.

C3.4.3 MINI SUBSTATION SPECIFICATIONS

The miniature substations will be Type B, 11kV/400V, outdoor installations on concrete plinths. The size of the transformers will be 500kVA. The impedance rating of transformer shall be 10% to limit the fault current level to 15kA. The installation must have an IP54 rating and be equipped with arc-proof explosion vents and arc-proof doors, fully complying with SANS 62271 standards for 21kA 1-second AFLR. A Schneider VIP400 self-powered relay with 60A:1A CTs, matched for the VIP400 or the closest standard will be required for protection and control. The miniature substation needed for internal reticulation within the campus must be painted Avocado (C12) green (To be confirmed by the Engineer).

The miniature substation should include:

1. Standard voltmeters and selector switch
2. Maximum demand ammeters
3. CT and VT tests blocks.
4. 16A outlet
5. SCADA capabilities for control and monitoring via GSM
6. Earth fault indication
7. Internal arc classification: IAC shall be IAB-AB
8. Integrated Oil Pan under mini sub to capture 110% of oil storage.

Remote monitoring, control and communication

All miniature substations will be fitted with GSM modules to allow for communication to the main SCADA system. The mini-substation remote monitoring and control system shall include an industrial-grade LTE Wi-Fi IoT router with dual SIM support for 4G cellular connectivity, integrated Wi-Fi, and at least four Ethernet ports to ensure reliable communication for remote operations. The router must feature automatic WAN failover to maintain uninterrupted network connectivity and minimize downtime. It shall operate on an industrial-grade operating system with customization options for professional use and support automation features to optimize performance. Security features, including VPN support, must be included to ensure encrypted and secure communication. Additionally, the system shall be compatible with a remote management system (RMS) for secure remote configuration, monitoring, and management, reducing on-site intervention and operational costs. The hardware must be robust, reliable, and suitable for industrial environments to support continuous monitoring and control of the mini substation. The router must be vandal proof and have

DNP3 and Modbus Protocol Integrated into MV to allow for communication and integration with the master G100 SCADA unit or similar to be installed in the 132kV control room.
The communication will facilitate remote monitoring of the minisubs alarms, loading and status indicators.

Communication enables the following functions to be carried out remotely:

1. measurement readings,
2. status readings
3. event readings and,
4. time- stamped measurements (2 tables of 100 events available)
5. time setting and synchronisation
6. remote control of breakers

MV COMPARTMENT

The Schneider VIP400 self-powered RMU will be housed in the MV compartment. Integral cable test facilities accessible from the front of the RMU and independent of the cable termination enclosure shall be provided ease of maintenance and testing. The RMU shall be supplied complete with unscreened separable connectors (USC) on the SD and screened separable connectors SSC on the CB comprising of a cable plug with bolted contact. Provision shall be made for the support (clamping) of two incoming (ring) cables in the MV compartment.
The circuit breakers shall be low pressure SF6 interrupter type. It shall be maintenance free. The position of the power and earthing contacts shall be clearly visible on the front of the switchboard. The position indicator shall provide positive contact indication in accordance with IEC 62271-100 standard.
The circuit breakers shall have 3 positions: open-disconnected, closed and earthed and shall be constructed in such a way that natural interlocks prevent all unauthorised operations. The rated current of circuit breaker as network points shall be of 630 A.
The rated current of circuit breaker and transformer feeders shall be sized according to the transformer. An operating mechanism can be used to manually close the circuit breaker and charge the mechanism in a single movement. It shall be fitted with a local system for manual tripping by an integrated push button. The MV breakers will also be designed for remote control via the SCADA system. Therefore, the RMU must be equipped with appropriately rated inverters and batteries to allow for remote monitoring of indication for opening and closing of breakers.

Equipment in MV compartment to be mounted

RMU requirements: refer Annexure A: SANS 1874: Schedule A and B.

I. Clause 4.3.5.1 applies. (Integral cable test facilities accessible from the front of the RMU and independent of the cable termination enclosure shall be provided for the two SD).

II. Where removable short-circuiting connections are provided for cable earthing (e.g. a removable star point connection), the re-instatement of these connections following cable testing shall not require the use of tools and/or the application of specific torque settings. This implies that no bolted connections are accepted. It shall not be possible to close the cable test facility if the short-circuit connections have not been re-instated. It shall not be possible to physically remove the short-circuiting connections from the switchgear. Consideration should be given to measures intended to prevent theft of the short-circuiting connections.

III. Where test probes are required in order to carry out cable testing, a complete set of three test probes shall be supplied with each ring main unit and securely mounted at a readily accessible location on the inside of the kiosk or access door.

IV. The RMU shall be supplied complete with unscreened separable connectors (USC) on the SD and screened separable connectors SSC on the CB comprising of a cable plug with bolted contact.

MV cable terminations

i. Cable sizes, 70-150 CU 3C.

ii. clamping of two incoming (ring) cables in the MV compartment. Two (hexagon) adjustable cable clamps manufactured from HDPE suitable for clamping cable sizes up to one 150 mm2 3-core PILC/XLPE cables (refer figure C.12 (b) SANS 876. Cable support clamps: Termination of MV cables: Provision shall be made for the support (refer figure C.12 (b) SANS 876.

LV COMPARTMENT

The LV side should be fitted with outgoing circuit breakers that connect the LV of the miniature substation to the new LV cable that will feed the existing LV board located in the relevant building. The size and quantity of the outgoing circuit breaker ratings will be based on the number of LV

circuits and the expected loading. Typical sizes include 100A, 150A, 200A, 300A, 400A, 630A, 800A, and 1000A. The minisub fault current rating required is 25kA.
The low-voltage terminals of the MSS transformer must be connected to the main LV circuit-breaker by means of conductors without phase crossover or as follows:

- Terminal A - Blue phase.
- Terminal B - White phase
- Terminal C - Red phase
- Terminal N - Neutral (black).

The connections between the RMU and transformer shall be without phase cross or with phase cross as outlined below (if so, specified in the order):

i) The terminal marked A or Red on the ring main unit must be connected to the terminal marked C on the primary side of the MSS transformer and be marked as the red phase.
ii) The terminal marked B or White on the main ring unit must be connected to the terminal marked B on the primary side of the MSS transformer and be marked as the white phase.
iii) The terminal marked C or Blue on the ring main unit must be connected to the terminal marked A on the primary side of the MSS transformer and be marked as the blue phase.

LV Assembly: General

iv) Busbars: finishing and colour coding shall be stated in schedule B.
v) Provision must be made to accommodate eight outgoing feeder bays suitable for 225A (JSO-type) MCCBs, (the MCCBs are not required).
vi) Separate LV earth bar shall be provided: the requirements of Schedule A apply.
vii) Gland plate: not required.
viii) V cable support: cable support rail is required. A cable support rail (e.g. uni-strut) shall be provided and fitted for LV cable support.
ix) Feeder circuits: LV assembly: Provision for mounting eight (type JSO) MCCBs.

The following equipment is required on the LV Side:

i) LV Indicating- with thermal maximum demand ammeters shall be provided for all three phases.
ii) Voltmeter: One voltmeter shall be provided with a selector switch.
iii) Energy meters: Include
iv) Main LV MCCB:

- 500kVA- 800A MCCB;

v) Socket outlet: Required

Ratings

MV equipment ratings

The MV switchgear shall be of SF6 – filled and ratings be in accordance with SANS 1874.
The rated insulation levels of all MV equipment shall be in accordance with SANS 876.

- The transformer ratings shall be in accordance with SANS 780.
- The nominal MV voltage rating of the mini-sub shall be 11 kV.
- The rated lightning impulse withstand voltage level for all MV equipment (i.e. list 2 or list 3 in table 1 in SANS 876:2009) shall be List 3. See SANS 876 2009: Table 1.

LV equipment ratings

- The LV equipment ratings shall be in accordance with the requirements of NRS 004.

Rated maximum power

- The rated maximum power of the mini-sub/s shall be the following:
- 500 kVA;

Rated frequency and number of phases

- The rated frequency of the mini-sub shall be 50 Hz.
- The number of phases shall be 3.

Design and construction requirements

General

- Mini subs shall comply with the requirements of SANS 62271-202 and the following additional specific requirements below:
- A mini-sub shall comprise the following:
  - one or more medium-voltage compartments for housing any of the following items of equipment:
  - SF6 filled ring main units in accordance with SANS 1874 (with MV interconnections);

- cable terminations;
- off-load dead-break isolating equipment with associated interconnecting conductors;
- MV metering equipment;
- a transformer compartment that has a transformer of power rating not exceeding 5 00 kVA and a rated voltage not exceeding 24 kV; and one or more low-voltage compartments with a rated voltage of up to and including 1 000 V.
- One or more customer cable compartments with a rated voltage of up to and including 1 000 V.
- LV busbar with a rated voltage of up to and including 1 000 V.

- A mini sub is intended to be used under normal service conditions in accordance with
- SANS 62271-202, and the following additional requirements apply:
  - an altitude not exceeding 1 800 m;
  - a relative humidity of 75 %;
  - the ambient air pollution level “very heavy” in accordance with SANS 60815-1;
  - **NOTE** For the purpose of this specification, “medium” and “very heavy” ambient air pollution levels correspond to “low corrosive” and “corrosive” environments respectively.
  - a minimum ambient air temperature of -10 °C (class “minus 10 outdoors”).
  - **NOTE** In the case of any special service conditions that differ from the normal conditions defined in 5.2.1.3, agreement should be reached between the purchaser and the supplier on the conditions for use of the equipment.

Design and construction

Type and dimensions

- The general arrangement of a mini sub shall be in accordance with the type B layout.
- The overall dimensions for all type B mini-subs shall be in accordance with the requirements of NRS 004.
- **NOTE** In the type B arrangement, the LV compartments are located on the end and front of the transformer, and the MV and LV compartments appear to be side by side when the mini-sub is viewed from the front.
- The dimensions for mini-subs with MV metering equipment shall be agreed upon between the CSIR and the supplier.
- A mini-sub shall be of the modular design (see 3.1).

Base

- The mini sub shall have a steel base and an oil pan.
  - The steel base shall be sufficiently rigid to allow the mini sub to be lifted and clamped to its plinth without being permanently deformed or damaged.
  - The oil pan shall be designed such that it has a drain valve to drain off the oil collected.
- The base shall not be of a removable section adjacent to the MV compartment door.
- The steel base shall be at least 75 mm high.
  - In the case of internal arc rated mini-subs, the steel base shall make provision for fixing the mini-sub onto the concrete plinth in accordance with NRS 004.
  - A 30Mpa concrete plinth is to be fitted with all mini subs.
  - The platform of the mini sub is to be 95% MODAASHTO and compacted with results shown to engineer for sign off.

Enclosure

- The enclosure shall be of mild steel in accordance with the requirements of NRS 004.

Roof

- The roof shall be in accordance with the requirements of NRS 004.

Facilities for lifting

- The facilities for lifting shall be in accordance with the requirements of NRS 004.

Materials

Enclosure

- The roof, walls and doors of the compartments shall be of mild steel.

LV ASSEMBLY structural parts (framework)

- The LV ASSEMBLY structural parts (framework) shall be of mild steel.

Fittings

- Door hinges, door locking devices and materials for vermin proofing ventilation openings shall be of a corrosion-resistant metal.

Gaskets

- Gaskets shall be installed at all interfaces, e.g. adjacent to compartments, between the enclosure and the base, and around the doors.
- The minimum thickness of a gasket shall be 3 mm before compression.
- The width of a gasket shall be in accordance with the corresponding interface dimension.
- **NOTE** The purpose of the gaskets is to seal the interface in order to reduce corrosion and the ingress of moisture. It also serves to reduce noise levels due to resonance or vibrations.

Compartments

- The compartments shall be in accordance with the requirements of NRS 004.

Transformer

Compliance

- The transformer shall comply with the requirements of SANS 780. Transformers shall carry valid product certification in terms of compliance with SANS 780, by an independent third party product certification body which possesses the necessary international accreditation. Such certification shall be issued in terms of the relevant certification body's mark scheme.
- **NOTE** A copy of the relevant mark scheme permit and accompanying schedules shall be submitted as proof of compliance.

Transformer tank

The transformer shall be hermetically sealed. The method of sealing the cover shall be welded. The transformer shall have a drain valve, a pressure release device, or a breather. The drain valve shall be lockable and is to be easily accessible and robust to ensure the oil sampling could be done. Positioning of the drain valve behind the LV busbars is not acceptable. A flat plate (e.g. glass, clear polycarbonate) oil level indicator shall be fitted in accordance with SANS 780. Perspex oil level indicators are not acceptable.

MV bushings and clearances

- The transformer bushings and their associated clearances shall be in accordance with SANS 876. The bushings shall be positioned horizontally, in a straight line.

Accessibility

- Transformer accessories (including, for example, the rating plate, the oil level gauge (if provided) or the off-circuit tapping switch) shall be so positioned that they are either visible or readily accessible (as relevant) when the relevant compartment door is open.

Radiators

- The radiators shall be in accordance with the requirements of NRS 004.

Transformer lifting lugs

- The transformer shall have lifting lugs by which it can be lifted after removal of the roof and disconnection of the cables and fastenings

Protection against corrosion

Transformer

- All surfaces of the transformer tank (excepting the contact surfaces of earth terminals) shall be coated against corrosion as specified in SANS 780.

Steel base

- The steel base shall be hot-dip galvanized in accordance with the relevant requirements of SANS 121 and, the steel base shall, in addition, be coated with black epoxy tar paint.

Enclosure and LV ASSEMBLY framework

- The enclosure and LV ASSEMBLY framework shall be in accordance with the requirements of NRS 004.

Colour

- All external surfaces of the enclosure (including protruding parts of the transformer, but excluding the base), shall be finished in the following preferred colour:
  - avocado (C12);

Electrical requirements

Earthing

- The earthing shall be in accordance with the requirements of NRS 004.

MV Compartment

Barriers

- All live unscreened MV equipment shall have flame retardant rigid barriers to prevent inadvertent contact by authorized persons. The barriers shall be metallic.

Equipment

- An RMU shall be mounted in the MV compartment.
- The ring main units circuit-breaker tee-off, shall have the protection requirements in accordance to 6.2.2.3 to 6.2.2.10.
- The protection tripping of the circuit-breaker shall be through a self-powered protection relay.
- Suitably rated CTs shall be provided and fitted based on the rating of the transformer being supplied. The CT ratios shall be stated in schedule B.
- Current sensor technology around the circuit-breaker bushings is acceptable.
- The protection CT type and class shall be stated in schedule B.
- The protection relay shall provide:
- an overcurrent function with normal inverse, very inverse, extremely inverse (IDMTL); definite time (DTL); and high-set instantaneous protection elements; and
- an earth fault function with definite time (DTL) protection elements.
- In order to assist operating personnel in identifying the cause of a circuit-breaker trip, a clearly visible indicator shall be provided to identify when a relay-initiated circuit-breaker trip has occurred.

- The protection relay, current sensors or current transformers shall be installed and wired complete for service.
- The protection relay settings and test requirements shall be subject to agreement between the manufacturer and the CSIR.
- Once the relay has been set, it shall be sealed to indicate evidence of tampering. The relay shall have a transparent front cover in order to view the relay settings.
- The insulation requirements for all MV equipment in air shall be in accordance with SANS 876.

Termination of MV cables

- All air-filled enclosures and MV cable terminations shall be in accordance with SANS 876 and NRS 053, respectively.
- The MV cable termination enclosure shall be suitable for the 300mm² PILCXLPE size and type of MV cables.
- The cable support clamp and gland plate (if applicable) shall be positioned above the bottom of the mini-sub base (i.e. above the top surface of the plinth).

Internal MV connections and terminations

Internal connections from the ring main unit to the transformer shall be unarmoured, screened, XLPE single-core cables in accordance with SANS 1339 or an alternative screened polymeric insulated cable (e.g. EPR) in accordance with IEC 60502-2. The metallic core screen shall consist of copper tapes or copper wires in accordance with the relevant standard.

- Where the ring main unit tee-off is equipped with type A bushings, the internal MV connection shall be a screened cable terminated with screened separable connectors at the type A bushings.
- Where the transformer or the ring main unit is equipped with outside cone plug-in type bushings with interface type C, the internal MV connection shall be as follows:
  - for mini-subs rated at up to 12 kV, the screened cables shall be terminated using screened separable connectors or unscreened separable connectors with single-core indoor terminations; and
  - for mini-subs rated at 24 kV, the screened cables shall be terminated using screened separable connectors.
- The screened single-core cables shall be earthed at the RMU end only.

- Lugs shall comply with SANS 61238-1 (class A) and shall be fitted using the type tested method. Where outside cone plug-in type bushings with an interface type C are used, the lugs shall have an M16 fixing hole.
- When tested in accordance with the requirement of NRS 004, there shall be no insulation breakdown in the MV interconnections and terminations.
- When tested in accordance with the requirement of NRS 004, the measured partial discharge in the MV interconnections and terminations shall not exceed 10 pC.

Earth fault indicators (EFIs)

- EFIs shall be provided.
- The EFI control unit shall be positioned in the MV compartment, and the current sensor shall be fitted to the left-side ring cable enclosure. It shall be possible to move the CT if necessary to the right-side ring cable enclosure. If applicable, the remote indicating unit shall be mounted on the outside of the mini-sub enclosure in such a manner that it can be clearly viewed from the front of the mini-sub (street front).
- **NOTE** The type of EFI and the design details shall be submitted for approval at the tender stage.
- The LV supply for the EFI shall be fitted with the following:
- a suitably rated HRC fuse; and
- a neutral fuse link.

Internal arc classification

- The internal arc classification (IAC) of a mini-sub shall be IAC-AB in accordance with SANS 62271-202.
- The classification test value (in kA) shall be of one of the values given in column 2 of table 2 in SANS 1874:2009, with a duration of 0,5 s.

LV Compartment

Barriers

- All bare live LV equipment shall have a flame retardant barrier to prevent inadvertent contact by authorized persons. Any barrier that obstructs viewing of necessary information

(e.g. the off circuit tapping switch, the rating plate), or position (e.g. the LV end compartment barrier) shall be made of transparent material (e.g. clear polycarbonate).

- **NOTE** The term “barrier” implies that a person would have to use a full forearm length to reach any live equipment.
- For type B mini subs, a barrier shall separate the LV end compartment from the front LV compartment.

Internal LV connections and terminations

- The connections between the transformer LV bushings, the LV busbars and the feeder circuit-breakers (if applicable) shall comprise 600/1 000 V, single-core, PVC-insulated flexible cables with stranded copper conductors that comply with SANS 1574-3. The number and size of the cables shall be selected to suit the continuous current and fault ratings of the transformer. The same configuration of cables as is used for each phase shall be used for the neutral. Appropriate derating factors shall be used where more than one cable is installed in parallel (bundled together). The cables from the LV bushing of the transformer to the LV busbars shall be flame retardant.
- Where a crimping method is to be used for terminating the ends of internal LV connections, long barrel-type lugs shall be crimped with a correctly matched crimping tool that only releases after full compression has been employed. Each lug shall be crimped in at least two adjacent points on the barrel, and the type tested crimping method in SANS 61238-1 shall be used. The lugs shall comply with SANS 61238-1 (class A). Tinned copper lugs may be used.
- Due allowance shall be made for short-circuit effects (such as electrodynamic forces acting on the connections) and for the avoidance of hot-spot creation due to any bracing arrangements.
- The cabling shall be colour coded. Colour coding may be done by using the colour of the PVC cable itself or by a coloured sleeve that is fitted over the cable or lug barrel (after crimping, if applicable). The required colours are:
  - RED, YELLOW, BLUE, for live phases; and
  - BLACK for neutral.

LV ASSEMBLY

General

- The LV ASSEMBLY shall comply with the requirements of SANS 1973-1 and the requirements in the following.

Phase and neutral busbars

- The LV ASSEMBLY shall be fitted with LV phase and neutral busbars in accordance with the requirements of NRS 004.
- Busbars (one per phase and a LV neutral) shall be made of hard-drawn copper and shall comply with the requirements of SANS 1195, where relevant. They shall extend the full length of the LV ASSEMBLY and be mounted on post insulators supported on a steel angle frame. All busbars shall be tinned or silverized in accordance with SANS 4521 using the coating classification Cu/Ag (0,95).
- Busbar supports, spacers and insulation systems shall be manufactured from materials the characteristics of which, for the purpose, have been established by tests to an appropriate SANS or IEC standard.
- The neutral busbar shall have the same cross-sectional area as that of the phase busbars.
- Busbars shall be permanently colour-coded according to the preferred colours given in (sec 6.3.2.4) this specification. Stickers shall not be used. Colour-coded busbar supports are acceptable.
- Clearance to earthed metallic framework shall be at least 20 mm, and spacing between phase centres shall be 185 mm. The spacing between the lowest (blue) phase busbar and neutral busbar centres shall be 300 mm in accidence to the requirements of NRS 004.
    - The busbars shall be arranged from top to bottom in the following sequence:
        a. RED,
        b. YELLOW,
        c. BLUE, and
        d. BLACK (neutral).
    - The LV phase and neutral busbars shall be drilled (centrally located 14 mm diameter holes) to accommodate the minimum number of specified outgoing LV feeder bays. These holes shall be horizontally spaced at intervals of 110 mm. The positions and alignment of the holes shall correspond to the LV outgoing feeder cable bays. No connections (e.g. earth jumpers or auxiliary equipment) shall be made to these feeder bay predrilled holes as they are dedicated for the LV feeder cables. The distance between adjacent feeder bay centre lines shall be 110 mm. The gland plate centre-line spacing shall therefore co-ordinate with the busbar hole spacing.

- **NOTE** This arrangement allows for the installation (as and when required) of paralleled fuse pillar units with a horizontal distance between axes (mounting holes) of 110 mm.
- An additional separate hole of diameter 14 mm shall be provided in the LV neutral busbar or neutral-earth busbar for all jumper connections from the LV or the MV earth bars.
- Holes required for auxiliary circuits may be sized to accommodate lugs and bolts appropriate for the current that flows through the connection.
- Corrosion-resistant (e.g. electrogalvanized, zinc-coated, stainless steel with copper compound) M12 set screws, nuts, washers and spring washers shall be provided for each of the 14 mm holes drilled on the LV phase and neutral busbars.

LV earth busbar and gland plates

- A separate dedicated LV earth busbar shall be provided.
- The LV earth or neutral-earth busbar shall be bonded to the MV earth busbar using a 70 mm2 copper jumper.
- When provided, the LV earth busbar shall consist of a rectangular section busbar of bare hard-drawn copper of cross-sectional area in accordance with the applicable value in table 1 in SANS 1973-1:2007. The busbar shall be at least 25 mm wide and insulated from the LV busbar support structure in accordance with the requirements of the phase and neutral busbars. The busbar shall have centrally located 14 mm diameter holes to clear M12 bolts at intervals of 110 mm along the entire length.
- When provided, the LV earth busbar shall be bonded to the LV neutral busbar using a copper jumper of cross-sectional area in accordance with the applicable value in table 1 in SANS 1973-1:2007 (only applicable if a separate LV earth busbar is provided).
- A gland plate arrangement shall be provided in accordance to NRS 004.
- When no LV gland plate arrangement is provided, a cable support rail (e.g. uni-strut) shall be provided and fitted for LV cable support.
- The distance from the gland plate or cable support rail to the top of the plinth shall be at least 100 mm, and there shall be at least 200 mm between the gland plate or cable support rail and the nearest LV busbar (either the LV earth or neutral-earth busbar).
- The gland plates and associated support structure or cable support rail shall be made of corrosion-resistant steel (i.e. galvanized steel, zinc-sprayed steel or 3CR12 steel) of thickness at least 3 mm. Galvanizing or zinc-spraying shall be carried out after drilling or machining (or both) of holes. To ensure good electrical contact between the cable glands and the gland plate structure, the gland plates and associated support structure shall not be coated or painted.

- When an LV gland plate arrangement is provided, the cross-sectional area of the steel gland plate support structure shall have an electrical conductivity equivalent to that of a copper cross-sectional area in accordance with the values in table 1 in SANS 1973-1:2007.
- When provided, each individual gland plate shall be secured to the steel support structure using 4 x M8 corrosion-resistant bolts. Two standard size holes (gland holes) shall be provided (punched) per feeder bay (gland plate) in accidence to NRS 004. The gland holes shall be ø 65 mm and ø 52 mm with clearances for the glands of ø 98 mm and ø 65 mm respectively. The distance between adjacent feeder bay centre lines shall be 110 mm.
- **NOTE** With the use of mechanical adjustable glands, the ø 52 mm gland hole can generally accommodate cable sizes up to 120 mm2 four-core cable (i.e. up to a No. 5 gland) and the ø 65 mm gland hole can accommodate cable sizes up to 240 mm2 four-core cable (i.e. up to a No. 6 gland). Where smaller glands are used, an appropriate gland reducer is required. Cable dimensions are based upon 600/1 000 V cables in accordance with SANS 1507-2.

Feeder Circuit

- The size of the cable used between the busbars and the feeder circuit-breaker shall be selected to suit the current rating of the circuit and the fault rating of the transformer.
- All connections to the busbars shall be made using corrosion-resistant steel set screws, washers, spring washers and nuts.
- The LV ASSEMBLY shall make provision for the mounting of the MCCBs and shall provide metallic rigid barricading panels for the live terminals (i.e. line and load side) of the MCCBs. The MCCB mounting equipment shall be positioned in such a way as to ensure that the minimum arc venting distances or clearance specified by the MCCB manufacturer are maintained in order to ensure that ionized gases released during a fault interruption (i.e. arc extinguishing) do not unduly affect the performance of the LV ASSEMBLY.

- MCCBs shall be fitted with individual inter-phase flash barriers on both the line and load side where possible. The spacing between the outer live terminals (metal) of adjacent MCCBs shall be not less than 20 mm. This is to ensure that the risk of a flashover that occurs between adjacent MCCBs (i.e. between the blue and red phases) is minimized during a short-circuit interruption event. The lug barrel and any exposed conductor of the single-core flexible jumpers shall be adequately insulated.
- A strip channel shall be provided and fitted to the LV ASSEMBLY for the purpose of labelling the individual feeder circuits. The position and length of the strip channel shall

correspond to the number of LV feeder circuits for which provision is made. The strip channel shall be fitted with blank sandwich-board (white-black-white) labels. The number of labels to be provided shall be equal to the number of feeder circuits. It shall be possible to slide the labels out of the strip channel for engraving purposes.

LV equipment

- The existing LV ammeter for building 26 shall be moved to the mini sub LV metering compartment and shall be provided for all three phases. The ammeters shall be phase-identified (e.g. colour-coded), thermal, maximum demand ammeters, that integrate over a 15 min period. The individual current transformers shall be of accuracy class 1 (or better), busbar mounted and securely fitted.
- One voltmeter shall be provided with a selector switch to enable any one of the phase voltages to be read. The LV supply to the voltmeter shall be fitted with the following:
  - three suitably rated HRC fuses; and
  - a neutral fuse link.
- The meters shall be the standard 96 mm × 96 mm type, mounted as high as is practicable.
- A main LV circuit-breaker shall be provided in the LV compartment between the transformer and the LV busbars. The circuit-breaker shall comply with the requirements of SANS 60947-2 and shall be fitted with phase (flash) barriers at the line and load side terminals. The circuit-breaker shall be positioned in such a way as to ensure that the minimum arc venting distances or clearance specified by the circuit-breaker manufacturer are maintained in order to ensure that ionized gases released during a fault interruption (i.e. arc extinguishing) do not unduly affect the performance of the LV ASSEMBLY.
- If specified in schedule A, a single-phase 16 A three-pin socket-outlet in accordance with SANS 60884-1 shall be provided and fitted with the following protection equipment:
  - an instantaneous trip earth leakage unit that complies with SANS 767-1 and that has
  - a 20 A load capacity,
  - a 5 kA rupturing capacity, and
  - 30 mA sensitivity;
  - a 20 A HRC fuse; and
  - a neutral fuse link.

- **NOTE** The socket-outlet earth should be connected to the LV earth or neutral-earth busbar and not to the MV earth busbar or any steelwork of the mini-sub. If the socket housing is

metallic, care should be taken to ensure that an electrical connection between the socket housing and the mini-sub steelwork is not made.

- LV compartment lamp holder in accordance with SANS 61184 with a transparent removable cover shall be provided and fitted.
- A street lighting panel shall be provided in accordance to NRS 004.
- The transformer unit shall not be fitted with a top-oil thermoelectric temperature-sensing element.

Auxiliary circuits

- The auxiliary circuits shall be in accordance with the requirements of NRS 004.

Transformer

- The transformer shall be in accordance with the requirements of NRS 004.

Consumer Compartment

- The consumer compartment shall be separate and independent from both the MV and metering compartments and shall open to the front of the mini substation. Access to the consumer LV sub-compartment shall be by way of an individual door that is lockable with a transponder key.
- It shall not be possible to obtain access to any other compartment from the consumer compartment. Barricades shall be used to prevent access between sub-compartments.
- LV busbars, earth bars and a gland plate arrangement shall be fitted in the LV customer panel.
- The panel shall be designed and constructed for the use of either vertical fuse-bases or large frame MCCBs.
- Provision shall be made for the support (clamping) of the consumer cable. An adjustable cable clamp, suitable for clamping two 300mm^2 x 4 core Cu cables shall be provided with the mini-substation.
- Once connected, the cable connections shall be fully barricaded and appropriately labelled, and access shall only be obtained by means of a tool. The colour of the barrier shall be Signal Red (A11) in accordance with SANS 1091.
- Suitable terminals for applying portable earths shall be provided, so that any work required to be performed on the mini-substation (i.e. CT's or VT) can be carried out between earths

viz. between the integral RMU circuit earth and the portable earth.

- The actual design layout and construction of all conductors and connections shall be submitted and shall be subject to approval and/or amendment by CSIR. In all cases, the necessary and relevant measures shall be taken with respect to voltage and stress control.
- The MV, metering and consumer compartment doors shall be labelled with “MV”, “Metering” and “Consumer” respectively. The labels shall be clearly and indelibly stencilled in black on both the inside and outside of all the compartment doors. The labelling shall be positioned near the top of the doors in a central position. The size of the letters shall be at least 80mm high.

C3.4.4. Precast Plinths and Oil Pan

All outdoor miniature substations will be installed on precast concrete plinths, with a single foundation required per minisub with the exposed aggregate. The concrete must have a minimum strength of 25MPa and appropriate dimensions for safe equipment mounting. Foundations must be level and stable during trench excavations, as specified in A-SPES-04-02 clause 3.3. The plinths will be designed to ensure that there is sufficient space to allow the cubicle doors to open properly and space for persons to work in and around the substation. The plinth protrudes at least 100mm above the normal ground level once it has been placed and settled.

The mini-integrated oil pan must be designed to contain 110% of the total oil volume from the transformer to prevent environmental contamination in case of leaks or spills. It should be constructed using mild steel that’s resistant to transformer oil and environmental factors. The bund should have a tap for drainage of oil or rainwater accumulation. The Oil pan must comply with relevant environmental and safety standards, be fire-resistant, and have access for regular inspections and maintenance.

C3.4.5. MV Cables

C3.4.5.1. MV cable Scope

Extend the existing 11kV 70mm² 3C PILC Cu cable ring by supplying, installing, jointing and terminating with new 16 x 11kV 70mm² 3C XLPE Cu cables with transition joints.

Extend the existing single core 300mm² Cu cables from the existing 2x transformers to the new MV switchboard by supplying, installing, jointing and terminating with new 18 x 11kV 300mm² 1C XLPE Cu cables. 3 x 1C 300mm² per phase.

All bolts, nuts, glands, ferrules, washers (bi-metal/flat/spring) not specifically quantified must be included for in unit rates.

C3.4.5.2. Cable Labelling

All cables shall be clearly and permanently labelled as per CSIR Standards. A uniform method of labelling shall be followed across the whole system. This will consist of an Aluminium or stainless-steel strip with the origin and/or destination indicated thereon.

All 11kV power cables are to be labelled at their termination points via a punched aluminium strip strapped to the cable, with a 7mm font size. Label to be made up as follows:

- Abbreviated source substation name: e.g. Har
- Abbreviated destination substation name: e.g. Jon
- Description: e.g. 11kV 70mm² PILC cable
- Sequential number: e.g. 1, 2, 3 etc.
- Where there are transition joints, the label must indicate this accordingly to ensure the operator is aware of the two types of cables.

C3.4.5.3. Technical Requirements

The screens and armouring of power cables running out of the substation to other locations are to be earthed on both sides to prevent dangerous high inductive voltages from occurring.

All control cables shall be laid, glanded, numbered and terminated according to the protection drawings and specifications.

Control cable lengths shall be made to reach the furthermost terminal block in the panel. No joints shall be made.

Spare cores shall be earthed at one end only and not at both ends.

Correct sizes of ferrule numbers shall be used per cable size and shall be black lettering on a yellow background.

All cable or wire numbering shall be so that it is readable from one position. Numbering shall not be inverted.

All crimping tools shall be fit for purpose and the dies suitably sized for a specific lug size to prevent over or under crimping. Where insulated lugs are used the correct crimping tool shall be used.

All lugs shall be fit for purpose and suitably sized.

The screen of any control cable shall only be earthed at the end always furthest away from the yard equipment.

The supplier shall supply, transport and off-load all the material and equipment necessary for installing all the cables.

All cables must be armoured.

Control cables installed on cable racks shall be fixed thereto by appropriate means without causing damage to the cable sheath.

All cable terminations must be provided with a fit for purpose and suitably sized cable gland.

All multi-core cables shall be manufactured in accordance with SABS 1507-1990 (or SABS 150-1970) and visibly identified as of flame retardant, low toxicity types.

All cabling shall be neatly run and fitted in or upon such cable trays, trenches, ducts or conduits as may be appropriate to the layout and equipment.

Bending radii as specified by the manufacturers shall be adhered to at all times. Consequential damage of failing to do so will be for the supplier's account.

All 11kV cable terminations and joints will be of the heat shrink kind.

All 11kV cables, cable terminations and joints will be pressure tested to the relevant specification.

Cable route markers must be installed where MV cables are jointed as well as where deviations occur.

Where a cable is to be installed in a location that may render it liable to mechanical damage, it shall be protected by appropriate means.

All existing services must be exposed by hand.

C3.4.5.4 Cable Testing

The supplier shall ensure that the system and its parts are fully tested before delivery and installation and shall then perform a final test after commissioning but prior to handover.

All MV and LV cables shall be tested as per the required specifications.

<u>Factory Acceptance Tests</u>

Copies of certificates for factory FAT tests performed on MV cables must be provided to CSIR.

<u>Site Acceptance Test</u>

After installation all cables will be tested as prescribed by aforementioned specifications and the required paperwork drawn up, therefore.

Final System Acceptance

CSIR will accept the system by means of a formal take-over certificate when:

- The supplier completed all the tests as is required to CSIR's satisfaction.
- All failures, problems and reservations noted during the tests have been corrected to CSIR's satisfaction.
- Hand over documentation and as built drawings have been submitted.

C3.4.5.5 Cable Warranty

The supplier will provide a warranty for a period of twenty-four months after handover of the system to CSIR and shall provide the following services as part of the warranty support during this period:

Repair or replace any cable termination or joint that has failed under normal working conditions. Any damage occurring as a result of the aforementioned will be for the supplier's account as well.

C3.4.5.6. Cable Documentation

The supplier shall supply all documentation including manuals and drawings related to the design, installation and commissioning of the systems and equipment supplied as part of the contract. All drawings submitted to CSIR shall be accompanied by an agreed drawing transmittal advice together with a master drawing register. The training, operating and maintenance manuals shall be cross referenced and shall be the correct manual for the equipment installed and not for similar equipment items or systems. CSIR reserves the right to approve the format and content of all documentation. The supplier shall verify the quality of the document to ensure fitness for purpose both technically and typographically.

Documentation Synopsis

The supplier shall provide, together with his offer an overview of the documentation to be supplied. This shall describe the structure and content of the documentation to be provided together with the offer.

Documents

The “as built” documents shall be updated and submitted to CSIR not later than one month after the successful completion of the site acceptance test and system hand-over. The documents shall be supplied on electronic media at that stage. The final payment certificate will not be processed until it has been submitted with: As built drawings of the MV cable route indicating joints and deviations with distances from boundaries or buildings and Test certificates of all tested MV cables together with the COC for the LV installation

C3.4.5.7. *Cross Link Polyethylene (XLPE) Specifications*

XLPE-insulated cables shall be of type A (armoured) construction in accordance with SANS 1339.

A Rated 6.35/11kV – 70mm^2 3 core – XLPE Type A, copper tape screened , PVC bedded, galvanized steel wire armoured, and PVC Sheathed shall be utilised to extend the existing MV Cables to the new switchboard.

Additional 6350/11000V, Copper, 1 Core, Type A single core copper 300m^2 cable shall be utilised to extend the cable from the transformers to the MV Board per phase.

Core Screen

The conductor screen, insulation and core-screen to be applied using a triple extrusion process and shall be dry cured. The metal screen shall be copper taped, and bedding shall be PVC. The core screen shall be strippable.

Bedding under Armouring

The bedding under the armouring shall comprise an extruded layer of PVC, type B1 in accordance with SANS 1411-2.

Armour

Single-core cables shall have wire armouring that complies with the requirements of SANS 1339 and of a type as specified in schedule A.
Three-core cables shall have steel wire armouring (SWA) that complies with the requirements of SANS 1339.

Outer Sheath

The outer sheath shall comprise an extruded layer of black flame-retardant PVC, type S5 in accordance with SANS 1411-2 or PE, in accordance with SANS 1411-7, as specified.

Core Identification

The cores of three-core cables shall be identified by the numbers 1, 2, 3, printed as numerals or words either directly on the extruded semi-conducting core screen or on the semi-conducting bedding tapes of each core, or by other acceptable means.

Anti-Theft Earthing Conductor

Anti-theft earthing conductor, interwoven construction containing tinned copper wire, galvanized steel and ultra tensile steel strands. The woven method must ensure that the strands cannot be easily separated. The sizes indicated in the pricing schedule is the copper equivalent of the earth wire (supplier will have to indicate the overall diameter to be used for the selection of lugs). All conductors are to be covered with transparent (clear) PVC. Section 8 is not applicable for this item.

This conductor must have a non-copper appearance, and the interwoven construction must make it very un-economical and difficult to recover the copper.

TESTS

Shall comply with the requirements of NRS 013. Documentation complying with the requirements of NRS 013 shall be submitted in a catalogue format.

MARKING, LABELLING AND PACKAGING

Shall comply with the requirements of NRS 013.

Special Markings on Cables

Cotton linen tape to be placed under the sheath, endorsed

Please provide details of any additional markings that the supplier is willing to provide that will assist CSIR combat the theft of cables. The additional marking or identification position and sample must be presented for the CSIR to make decision on admissibility. Please also indicate the cost implication of such intervention.

C3.4.6. LV Cables and Control Plant Cables

C3.4.6.1 Auxiliary AC board

Supply, install and terminate 3x 600-1000V 4C Cu cable from local minisub to the AC distribution board in the MV switch room and the AC Distribution board in the HV Control room adjacent.

Supply, install and terminate 600-1000V Cu cables to panel heaters.

Supply, install and terminate 600-1000V Cu cables to BTU.

Supply, install and terminate 600-1000V Cu cables to axial fans.

C3.4.6.2 DC BTU

Supply, install and terminate 600-1000V Cu cable to MV Incomers 110V DC

Supply, install and terminate 600-1000V Cu cable to MV Bus Sections 110V DC

Supply, install and terminate 600-1000V Cu cable to MV Feeders 110V DC

Supply, install and terminate 600-1000V Cu cable to PFC 110V DC

Supply, install and terminate 600-1000V Cu cable to RTU 110V DC

The cabling required to relay all DC alarms must be included for in the SCADA solution.

C3.4.6.3 Protection cabling

The installation of all the cabling between the protection panels and other related equipment as well as any bus wiring must be included for under the unit rates for the switchgear. All this cabling shall be installed neatly on cabling racking of which the cost must also be included under the unit rates for the switchgear.

C3.4.6.4 Metering Cables

Supply and install all the required internal wiring of the metering panel.

Supply and install all the required cabling between the incomers and metering panel.

C3.4.6.5 SCADA Cables

All Cu cables / twisted pair cables as well as fibre cable required to ensure a complete and fully operational SCADA system including any station alarms must be included for under the SCADA unit rates. This includes, but is not limited to, DC.

C3.4.6.6 LV cabling and Accessories

LV power and control cabling and accessories shall comply with the relevant codes of practices and standards. Installation of the cables shall comply with SANS 10142-1:2024.
The contractor shall supply and install all the necessary multi core control cables and power cables required for the correct operation of the installation.
Cables shall be terminated using suitably sized compression glands. Outdoor glands shall have an IP rating of better than or equal to the enclosures IP rating to which the cable is being terminated. Outdoor glands shall be provided with a neoprene shroud which is UV protected.
Cables shall be neatly installed on cable racks, ladders or basket and properly secured at regular intervals by means of clamps, straps and ties. Plastic / PVC ties shall not be allowed outdoors.
All cable trays, basket and ladders shall be neatly installed, properly secured and free of sharp edges. All cable trays, baskets and ladders and their accessories shall be hot dip galvanised.
Cable fixing accessories shall be fit for purpose and installed to the engineer's satisfaction.
Power cables shall be de-rated as necessary to SANS 10142 where installed in exposed locations or in trenches with other current carrying cables. Wiring diagram and schematic wiring diagram of control circuits for each type of panel shall be provided. On the wiring diagrams internal wiring of relays shall be shown.
Wiring diagrams shall give details of all control cables required between items of equipment.

C3.4.6.7 Cable block Diagrams, Scheme Drawings and Schedules

The contractor shall be responsible for the preparation of Scheme drawings, Logic Diagrams and schedules for the installation of cables as per the proposed control schemes and provide updates to complete the cable block diagrams.

C3.4.6.8 Labels

Where the labels are to be located in the outdoor yard, these shall be made of a luminous durable material. A sample must be provided prior to manufacture for approval by the Engineer.
The labels shall have the bay name inscribed on it. The characters shall be black and at least 150 mm high and 100mm wide. The characters shall be placed on a yellow/orange luminescent background which reflects when light is shone on it. The label shall be mechanically fixed to the

structure by means of stainless-steel nuts and bolts. - A minimum of four diametrically opposite holding down positions shall be drilled through the label board. It is recommended that the substation labels to be used are baked enamel.
Where the labels are to be located in the control room or switching room these shall be made of Trifoliate or other similar material. The lettering shall be engraved. Dymotape or similar types of labels shall not be used.
All labels shall be fixed mechanically, glued on labels will not be accepted. (Self-tapping screws are not acceptable). Panel identification labels shall be fitted to both front and rear of each panel and to the with-drawable portion of each breaker. A panel number shall be included, starting with "1" from the left-hand side facing the front of the panels and ending with the last panel.
Blank spares shall be included with each panel.

C3.4.6.9 LV Cable Testing

The supplier shall ensure that the system and its parts are fully tested before delivery and installation and shall then perform a final test after commissioning but prior to handover.

All MV and LV cables shall be tested as is required be the mentioned specifications.

Factory Acceptance Tests

Copies of certificates for factory FAT tests performed on LV cables must be provided to CSIR.

Site Acceptance Test

After installation all cables will be tested as prescribed by aforementioned specifications and the required paperwork drawn up, therefore.

Final System Acceptance

CSIR will accept the system by means of a formal take-over certificate when:

- The supplier completed all the tests as is required to CSIR’s satisfaction.
- All failures, problems and reservations noted during the tests have been corrected to CSIR’s satisfaction.
- Hand over documentation and as built drawings have been submitted.

C3.4.6.10 LV Cable Warranty

The supplier will provide a warranty for a period of twenty-four months after handover of the system to CSIR and shall provide the following services as part of the warranty support during this period:

Repair or replace any cable termination or joint that has failed under normal working conditions. Any damage occurring as a result of the aforementioned will be for the supplier's account as well.

C3.4.6.11 LV Cable Documentation

The supplier shall supply all documentation including manuals and drawings related to the design, installation and commissioning of the systems and equipment supplied as part of the contract. All drawings submitted to CSIR shall be accompanied by an agreed drawing transmittal advice together with a master drawing register. The training, operating and maintenance manuals shall be cross referenced and shall be the correct manual for the equipment installed and not for similar equipment items or systems. CSIR reserves the right to approve the format and content of all documentation. The supplier shall verify the quality of the document to ensure fitness for purpose both technically and typographically.

C3.4.6.12 <u>LV Documentation Synopsis</u>

The supplier shall provide, together with his offer shall provide an overview of the documentation to be supplied. This shall describe the structure and content of the documentation to be provided together with the offer.

<u>Documents</u>

The "as built" documents shall be updated and submitted to CSIR not later than one month after the successful completion of the site acceptance test and system hand-over. The documents shall be supplied on electronic media at that stage. The final payment certificate will not be processed until it has been submitted.

As built drawings of the MV cable route indicating joints and deviations with distances from boundaries or buildings. Test certificates of all tested MV cables and COC for the LV installation

C3.4.7. 11 kV Switchgear

The 11kV switchgear shall be supplied by the Contractor as part of this contract. The 11kV switchgear will be supplied according to the latest national/regulatory specification and CSIR specifications.

The incoming breaker cable end box will be suitable to terminate 5 X 300mm^2 (PILC, CU 1c/ph) cables per phase and 2x 630mm^2 (XLPE cable CU, 1c/ph) for the future cable replacement.

CSIR requires that all 11 kV switchgear shall have a remote protection and control panel. This remote panel shall be installed in the adjacent spare room. This remote protection and control panel shall form part of this contract, and is specified in *C3.4.9 Control and Protection Equipment.* All holes in any panel will be sealed and made vermin proof with sealing products similar or better than Roxtec products.

Rated characteristics of the switchgear

Nominal system voltage:	11kV
Rated voltage:	12kV
Rated peak insulation level:	95kV
Rated frequency:	50Hz
Rated current of circuit breakers:	1250A minimum (BS/Incomer) / 800A Outgoing
Rated current for Incomer panels:	1250A minimum (BS/Incomer) /800A Outgoing
Rated busbar current:	1250A minimum
Rated breaking capacity:	25kA for 3 seconds
Power frequency withstand voltage:	28kV (r.m.s) minimum (sea level)
Number of busbars:	Single 3 phase

C3.4.7.1. Supply, deliver, install and commission

<u>11kV Switching Station</u>

- 19 panel, 11kV IEC61850 enabled switchgear boards consisting of 2 x Incomers, 1 x Bus Sections, 2x VTs and 16 x feeder panels.
- 11kV Incomer feeder SBV4E 11kV VT's integrated onto Incomers 11000/110V, 100 VA CL 0.5 SBV4E or similar.
- Associated on-board incomer (11kV Incomer feeder onboard Protection scheme with SEL 751 relay (Including Arc Protection) coupled installed with 1250A indoor Breaker and panel Including CT's and heater circuit. SBV4E. (P. N : 751101DCDBD7781BD30) or similar.
- Associated on-board outgoing feeders (11kV Outgoing feeder onboard Protection scheme with SEL 751 relay (Including Arc Protection) coupled installed with 800A indoor Breaker

and panel Including CT's and heater circuit. SBV4E. (P. N : 751101DCDBD7781BD30) or similar,

- Associated on-board bus section (11kV Bus-section onboard Protection scheme with Controller (Including Arc Protection) coupled installed with 1250A indoor Breaker and panel Including CT's and VT (100VA CL 0.5) and heater circuit. SBV4E. (P.N: 751101DCDBD7781BD30) or similar.
- The switchboard shall include busbar protection and control schemes as specified in this document. This includes all fibre and/or copper communication networks between components supplied within the substation and communication cables and software required to set-up or interrogate protection relays.
- One new 110V DC supply system with a DC distribution board as specified in this document.
- One new 420/240V AC supply system with an AC distribution board as specified in this document.
- Integration of on-board protection, control and other equipment into the new SCADA system. This includes the supply of all equipment and fibre communication links required within the substation.
- Protection coordination and setting of board to include interlocks.

C3.4.7.2. Labelling

All cubicles, equipment and cables shall be clearly and permanently labelled. A uniform method of labelling shall be followed across the whole system. Each piece of equipment shall contain the original manufacturer's marking including the manufacturer's name, equipment type, model number, and serial number. In cases where this is not available an information plate must be manufactured attached to the device

C3.4.7.3. Switchgear requirements

The switchgear shall be type tested in accordance with IEC62271-200 and will conform to a minimum Internal Arc Certification of AFLR 25kA/1s in. Type test certificates must be submitted with the tender.

The switchgear supplier shall take cognisance of the switchgear room and the environment where the switchgear will be installed and provide a qualifying statement with his tender on the suitability and additional requirements of/for his offered equipment based on IEC 62271-200.

The maximum three phase fault level at each switching station is 25kA at 11kV.

The switchgear will consist of an air insulated board with a single busbar and three busbar sections.

A floor frame must be supplied with the switchgear to cater for installation into the floor when it is cast to prevent installation on uneven substation floor surfaces.
Provide and install switchgear trench supports. (if required)

Current transformers shall be resin encased bar type, connected between the incoming cable and the circuit breaker contact connections.

Voltage transformers shall be retractable type, mounted on with incomers and connected to the busbar.

A cable feeder earth switch will be provided for each feeder panel of the MV board. Sufficient interlocking will be provided to prevent inadvertent closing of an earth switch onto a live busbar. Cable and Busbar Live indicators will be of a type that allows for secondary phasing checks.

Busbar arc protection schemes will be incorporated into the Incomer panel LV compartments.

On-board LV compartment cubicles must be suitably sized to accommodate the various protection schemes. Proposed LV compartment door layouts must be submitted with the tender.

Supplier will provide general arrangement drawings with their tenders, clearly indicating the following:

- Front and side views with panel dimensions.
- Bottom view with power cable, control cable and panel fastening dimensions and details.
- Positioning within the switching station considering cable trenches and clearances with substation walls.
- Proposed interlocking philosophy.
- The approval of any equipment, documentation or designs will not relieve the supplier from his responsibility to provide a fully engineered, working solution to the satisfaction of CSIR.
- Wooden or HDPE power cable support structures must be included.
- Gland plate for control cables must be included.

Where required should the earth resistance is greater than 1 ohm, at the corners of the building install 2 x 1.5m copper earth rods in series and connect by means of 50 x 3mm flat Cu earth strap. At each corner install 50 x 3mm flat Cu earth strap long enough so that it can be connected to the trench earth as above. All the metal cubicles, switchgear, auxiliary transformers, cable racking etc. will be bonded thereto by means of a 50mm² BCEW by means of a fit for purpose termination. Earth readings must be done before the foundations are poured. If the earth reading is higher than 1ohm a 5m piece of 50x3mm copper strap must be added to each corner and the reading taken again. This must be repeated until less than 1ohm is reached.

The upgraded building was designed to accommodate panels with maximum allowable specifications as follows:

	WIDTH	**WEIGHT**
Incomers	630mm	1200kg
Bus sections	630mm	1200kg
Feeder	630mm	850kg

C3.4.7.4. General Requirements for Equipment

C3.4.7.4.1. General

All equipment supplied by the Contractor must be new, of the best quality available and must comply with this Specification and the attached specifications of CSIR.

All equipment used in the installation must have the prior approval of the Engineer.

C3.4.7.4.2. Instruction Manuals, etc.

The Contractor must supply the Engineer with at least four (4) sets of detail mechanical and electrical drawings as well as user instructions and maintenance manuals of equipment on completion of the project.

C3.4.7.4.3. Inspection

The Contractor shall inform the Engineer of any equipment which is ready for despatch, in which case the Engineer will arrange for an inspection at the factory of the manufacturer when it is deemed necessary. Where equipment is to be inspected overseas, the contractor is to make

allowance for two (2) CSIR Officials to travel to the manufacturing plant to witness the respective equipment tests. All associated costs are to be included in the tenderers offer for consideration. The contractor is to notify “The Engineer” and the CSIR stakeholders in due course of the inspection dates and shall be notified 10 days prior to despatch.

Three copies of all equipment test reports, whether these tests have been carried out in the presence of the Engineer or not, shall immediately after they become available, be submitted to the Engineer.

C3.4.7.4.4. Interchangeability

All equipment must be manufactured to such close tolerances so that all similar components and spares are fully and completely interchangeable with the existing equipment of CSIR.

C3.4.7.4.5. Commissioning

The Contractor shall be responsible for the testing and commissioning of the complete installation. The Contractor shall notify the Engineer, in writing, 14 days prior to the abovementioned test to allow him to make the necessary arrangements.

C3.4.7.5. Civil General

C3.4.7.5.1. Foundations

All the foundations shall form part of this Contract and shall be provided according to the drawings and specifications.

All the holding down bolts in each foundation shall be protected against damage during the construction process. The Contractor shall ensure that the holding down bolts shall fit the supporting structure.

C3.4.7.5.2. Switch House Building

The construction of the substation building upgrade shall form part of this Contract. The substation building as indicated on the drawings shall consist of a 11kV switchgear room, one Capacitor bank room, a relay room (To remain as is), storeroom/operating room.

As part of this contract, the contractor will be responsible to obtain the approval of the entire building plan which includes the attached building as per the Architect's drawing. This will include the following:

1. Updated drawings of proposed works as needed. These drawings and amendments will be made available in electronic format.
2. Appropriate certification from a qualified and registered Architect and/or Engineer as required.
3. Fulfil requirement for the City of Tshwane building control approval.
4. Providing an updated COC and Roof structure certificate.
5. Structural Engineers approval certificate.

The alterations envisioned for the existing switch room entails work within an existing single storey structure to widen existing cable trenches and adjust the space inside. No alterations to the structure itself (foundations, structural support system, etc.) are planned.

The minimum structural specifications, therefore, will be:

1. General
    1.1. Conformance to good building practices and building standards (SABS1200)
    1.2. Conformance to Bigen Africa structural/project specifications
    1.3. All levels and dimensions are to be confirmed on site prior to construction.
    1.4. No work is to alter or change the existing structure and structural system without the written approval from the engineer.
    1.5. The work includes a 6mm under-pattern vastrap plate with 40x40x4 SHS stiffeners to detail provided on the drawing 3784.00.02.GZA.14.U001 and 3784.00.02.GZA.14.U002.

2. Groundwork
    2.1. Layer works below the surface beds, trenches, and foundations are to conform to civil engineer specifications.
    2.2. A minimum of 100 kPa allowable bearing pressure to be achieved.

3. Surface beds and trenches
    3.1. The thickness of the extensions is to match the existing thickness but should be no less than 150mm. This to be confirmed on site.
    3.2. Concrete to be 25 MPa / 19mm

3.3. Reinforcement to be high-yield tensile reinforcement in either the form of mesh or conventionally detailed reinforcement
3.4. A damp-proof course (DPC) is to be provided, minimum 250 microns, according to the architectural requirements
3.5. Joints (saw joints, isolations, etc.) are to be provided based on the existing pattern, and sealed to match the existing joints

4. Foundations
   4.1. Concrete to be 25 MPa / 19mm
   4.2. Reinforcement to be high-yield tensile reinforcement
   4.3. The foundation levels to match the existing foundation levels and to tie in with the existing.

5. Masonry walls (Internal only):
   5.1. 10 MPa (minimum) masonry units (NFP) conforming to Class II
   5.2. Mortar to be Class II (minimum 10 MPa)
   5.3. Brickforce to be provided in every third masonry course, and in every course above doors and/or windows
   5.4. At tie-in positions with existing masonry, concrete, or steel, and at masonry joint positions, galvanized hoop iron straps (30x1.6mm thick and bent to profile) are to be provided in every third masonry course
   5.5. Steel or concrete wall stiffeners to be provided in internal walls in excess of 8m lengths

6. Steel
   6.1. Grade S355JR steel to be used for any structural steel elements
   6.2. All steel elements (including trench covers) to be corrosion proofed/hot dip galvanized
   6.3. Trench covers to be 5mm thick (under pattern) “vastrap” plate
   6.4. Cast-in angles (to match existing) to accommodate the trench covers to be to be provided with lugs to be cast in with new concrete surface beds and/or trenches

C3.4.7.5.3. Switch Trench and Fire Wall

The switchgear room has been designed to accommodate the 11kV switchgear available in South Africa. The room shall be large enough to accommodate a larger board should it be required in the future.

(a) The switchgear offered shall also affect the positioning of the fire wall.
(b) A new Fire wall is to be instated between the capacitor room and the switchgear room.
(c) The cable trenches shall be covered with GRP Grating (with hard wearing slip resistant grit bonded to the surface).

C3.4.7.5.4. Switch bay Doors

Switch bay single doors are to be of the push bar type from the inside to permit easy exit in case of emergency. These doors will be at least 2.1m height.

C3.4.7.6. Earthing

The integrity of the existing earthing is to be measured and where the reading is below 1ohm. Copper flat/round bar and flat bar is to be placed to meet the desired earthing standard requirements. A Provision for earthing is made.

C3.4.7.6.1. Quality of Work and Standards

All work shall be carried out strictly in accordance with the Code of Practice for earthing, (CP 1013). Earth rods, couplers and clamps shall be supplied and installed in accordance with SANS 1063/SANS 1063-1998 and SANS 10199/SANS 0199, NRS 076 and CSIR Specifications.

C3.4.7.6.2. Design and Approval

The Contractor shall allow for soil resistivity tests to be performed on site. A detailed report on the resistivity tests shall be submitted to the Engineer. If the results are not within spec, a preliminary earthing scheme shall be submitted showing how the Contractor envisages installing the upgrade to the earth mat before commencing installation of the earth mat upgrade. The Contractor shall employ a specialist to investigate, plan and install the earthing installation.

The earth mat installation shall incorporate earthing electrodes at the extreme corners of the station, in the vicinity of earthing switches and transformer neutrals. The fences shall also be earthed at regular intervals.

The installed maximum earth resistance shall be below 1 Ω, or as agreed by the Engineer. The earth conductors shall generally be laid at a depth to suit below the finished surface.

The complete earth mat design shall be submitted for written approval. The Engineer may then add or delete equipment and change the design of the earth system if he so requires. The installation of the earth mat shall be so arranged as not to cause delays.

C3.4.7.6.3. Earth Resistance Survey

The Contractor will be responsible to have an earth resistance survey carried out on site by a specialist in this field, to be approved by the Engineer.

The Engineer shall attend the survey. The Contractor shall inform the Engineer in good time when the test is scheduled to take place. If it is done without the Engineer or his representative being present, the test shall be repeated in the Engineer's presence at no additional cost. The results of this survey will be used to adjust the earthing system as specified herein, if necessary, on the basis of the quoted rates. Payment for the services of the specialist shall be borne by the Contractor. The test is to be redone once the platform is complete.

C3.4.7.6.4. Indoor Equipment Earthing and Cable Trenches

Control panels, battery chargers, cable racking and other indoor auxiliary equipment shall be bonded by copper bar of 70 mm^2 cross section (minimum). An earth strap of 150 mm^2 cross section shall be laid in the cable trench together with the multicore cables. This earth strap shall be run into the building and serve as the building earth to which all equipment in the building is connected. The building earth shall be connected to ground rods at diametrically opposite ends of the building.

C3.4.7.6.5. Earthing Electrodes

The number and lengths of earthing electrodes shall be determined from the resistivity tests above. Earthing electrodes shall be of the extendible rod type. The rods shall be of copper clad steel and the copper to steel weld shall be a true molecular bond.

C3.4.7.6.6 Earthing System

- As part of the Civil Contract, the total main earthing system of less than 1 ohm (as provided and tested), shall be installed.

- The connection of all equipment to the main earthing system forms part of this contract.

- The earthing system shall be installed according to specification SCSABK2 in the CSIR premises. Specification can be made available to contractor upon request.

- The total earthing grid system shall be installed at a depth of at least 1000mm below the ground level around the existing substation building where new conductor is being installed without impacting the integrity of the structure. The Conductor is to be placed such that that the step and touch potential are within the compliance perimeters.

- Upon the earthing system being installed in the ground after completion of the civil contract, all back filling of trenches shall be done in layers not exceeding 200 mm in thickness. These layers shall be compacted to the original density and to the approval of the Engineer. All such trenches shall finally be re-instated to original finished ground level, prior to any yard stoning being placed into the yard. Any use of trenches for earthing or other cables shall be made good at the cost of the Contractor.
- All relay and control panels, switchgear, transformers, auxiliary transformers, outdoor switchgear and associated equipment as well as all cubicles and panels shall be earthed to the earthing system to the full approval of the Engineer. No single component shall be left unearthed.
- Tests shall be done on completion of the installation to prove earth continuity of each piece of equipment to the main earthing system.
- All equipment shall be earthed in two positions by separate connections.
- Boreholes and earthing electrodes. If required to improve the earthing, the Contractor shall quote for MARCHANITE or conductive concrete filled boreholes.
- Earthing in substation buildings and cable ducts for all primary equipment
- Earth bars with the minimum cross-sectional areas of 300 mm2 shall be provided and installed in the cable ducts within the substation buildings as well as any other steelwork within the building.
- The earth mat will extend 1 meter beyond the most outer fence perimeter.

C3.4.7.7 Tests to Complete Commissioning Milestones

Dry testing as part of construction milestone shall include the following:

- Visual checking of general appearance and equipment labelling

- Checking of all terminations
- Verification of correctness of field equipment statuses in relation to SCADA System
- Testing of cables
- Checking of all safety settings
- General safety of installations

C3.4.7.8. Fire Extinguishers

Fire extinguishers with signage, mounting brackets shall be installed in the building as indicated by engineer.
The fire extinguishers shall be of the CO2 type suitable for electrical fires.
The successful contractor will be responsible to determine the “exact” requirements for the substation and utilize the supplied drawings and document as a guideline for substations requirements. Any approvals required will be the responsibility of the contractor.

C3.4.7.9. First Aid Kits

An industrial version of the "St John’s First Aid Kit” of the plastic encased suitcase type, suitable for wall mounting, shall be provided and installed in a convenient position next to the main entrance door in the control room.

C3.4.7.10. Security Locks

It is required of this specification that the contractor shall supply and install all security lock systems for locking of entrance gates (internal and external) as well as locks for the locking of substation doors.
In addition to the abovementioned locks, the contractor shall also supply and install all the required security locks for locking equipment in the open or closed position.
All locks shall be provided with triplicate keys and locks shall be of the standard types normally used by CSIR. It shall be the responsibility of the Contractor to obtain the required information from CSIR prior to purchasing of locks. All locking systems shall in addition be to the full approval of the Engineer.

C3.4.7.11. Signs and Notices
C3.4.7.11.1. General

The provision and installation of the necessary danger signs and notices required in terms of statutory regulations, as well as all fire extinguishers and the necessary first aid kits, forms an integral part of this Contract. All these items shall be supplied and installed on positions to be approved by the Engineer prior to the commissioning of the substation.

C3.4.7.11.2. Danger Signs

The following danger and warning signs and notices shall be provided and installed throughout the respective substation site.

Main Access Gates:
The main access gates shall make provision for the Substation Name and the “4 in 1” danger signs.

Security Gates and Removable Panels:
The following signs shall be fitted to all security gates and removable sections of such security fences: -

"DANGER" as well as "UNAUTHORIZED ENTRANCE PROHIBITED".

Inner Security Access Positions:
The inner security gates as well as the main entrances to the control and protection rooms shall be provided with the following warning signs: -
"WARNING - ALL UNAUTHORISED PERSONS ARE PROHIBITED FROM HANDLING OR INTERFERING WITH ELECTRICAL APPARATUS".

Medium Voltage Switch Rooms and Control Rooms:
The following additional notices shall be installed on the inside of each of the main access doors to the medium voltage switch rooms or in a more convenient place approved of by the Engineer:
"FIRST AID TREATMENT OF ELECTRICAL ACCIDENTS" as well as "PROCEDURES IN THE CASE OF FIRE".

Contractors may make use of the combined notice "UNAUTHORIZED ENTRANCE, PROCEDURES IN CASE OF ELECTRICAL ACCIDENTS AS WELL AS PROCEDURES IN CASE OF FIRE" as a single notice.

C3.4.7.11.3. Battery System

The necessary warning sign against corrosion shall be fitted to the doors of the battery system. The wording of this sign shall be: "WARNING OF CORROSION".

C3.4.8. 11KV SWITCHGEAR ASSOCIATED SUB-SYSTEMS

C3.4.8.1. General

Supply shall include the following:

- Manufacture, purchase, design and assembly of all equipment included within the Scope of Work.
- Provision of Functional Design Specification Documents for Review and Acceptance before detail design work commences.
- Provision of Detail Design Drawings for Review and Acceptance before construction and assembly commences.
- Comprehensive Factory Acceptance Testing.
- Manufacturers Documentation and Maintenance Manuals for all equipment supplied.
- Separate Remote Control Switching Board and switches with indication lamps to accommodate remote tripping via push button for 21 feeders as per OEM Spec in a wall mounted board. Housed in PFC Room

Delivery shall include loading, transport and offloading into the switch room..

Installation shall include the following:

- Complete erecting of the equipment within the Scope of Work including all internal wiring, bus wiring and bolts & nuts as per the manufacturer’s specifications.

Commission shall include the following:

- Full functional site acceptance testing, electrical as well as mechanical and seamless integration of all systems and sub-systems within the scope of work.

Project Management shall be provided for the project as a whole and shall include the management and coordination of all subcontractors.

Training (Mainly on-site during commissioning) must be provided to CSIR personnel on all equipment supplied. The cost for this training, if any, must be included in the tendered rates.

C3.4.8.2. Protection requirements

The supplier shall check and design the Incomer, Feeder and Busbar protection schemes for compatibility with the intended use as a whole and for the proposed SCADA implementation. The switchboard shall be wired and set such that if one of the transformers MV breakers are open due to a fault, a system health check is to be done and after its safe, the other transformer MV breaker shall close, and the bus section breaker shall automatically close on load to ensure continuality of supply while ensuring safety. These MV incomer breakers and bus section breakers shall have an automatic transfer switch for on load capabilities to switch on while on load.
It is a specific requirement of this Contract that one set of special software and communication cables required for the setup or programming of protection relays or meters be supplied as part of the contract.

C3.4.8.2.1. Main Busbar Protection: Arc Detection

Busbar Protection schemes will consist of an Arc Detection scheme combined with a Busbar Blocking scheme. In addition to the busbar Arc Detection, each feeder cable compartment will be monitored as an individual zone.

C3.4.8.2.1.1. Arc Detection Scheme

The Busbar Arc Detection scheme must operate independently from any other protection scheme and operation must be based on a two out of two principle, i.e. combined light and current detection, before issuing a trip. Arc detection must be via radial “lens” sensors installed in all the relevant switchgear compartments. Current supervision of feeder cable compartment zones may be included in the feeder protection relay.

Integrated Arc protection capabilities onto the OC/EF relays must be networked to provide interconnection for the entire board to achieve monitoring and protection of all panels from arching faults. Operation time of the high-speed relay will be ≤ 7ms.

Arching sensors will be 3 per panel with exception of the b us section panel which will have four sensors.

The Arc detection main and/ or extension units will conform to the following requirements:

- The system must be fully supervised and positively alarm all auxiliary voltage and communication channels between the main and extension units. Extension units per zone must be powered from the main unit for that specific zone. In the event of hardware failure, only the affected equipment must lock out and alarm to prevent an incorrect operation.
- LED's must indicate overcurrent detection and light detection per specific sensor to locate faulted compartments fast and reliably.
- Overcurrent detection will allow for three-phase and two-phase and neutral overcurrent detection. Phase overcurrent detection should be selectable between 50% to 600% and neutral overcurrent detection between 5% to 60%.
- Light detection level adjustment based on manual or automatic backlight intensity compensation.
- Two high-speed trip outputs suitable for direct tripping of incomer and bus section circuit breakers with a maximum total operating time ≤ 2.5ms.
- One heavy duty trip output suitable for inter-tripping under breaker fail conditions with a maximum total operating time of < 15ms. Breaker fail protection must be current supervised with a selectable 100ms or 150ms time delay.
- Current transformer inputs will have selectable 1A or 5A inputs with the following minimum thermal ratings:
    - Continuous: 4xIn
    - 1s Short time: 100xIn
    - Dynamic half cycle: 250xIn
- Any trip operation must latch the output contacts until a manual reset of the protection is performed.

C3.4.8.2.1.2. Busbar Arc Protection Zones

The arc protection for each 11kV board will consist of 2 zones, one on each side of the Bus Section panels. The bus section circuit breaker compartments will fall within both Arc Protection zones.

- The system must be fully supervised and positively alarm all auxiliary voltage and communication channels between the main and extension units. Extension units per zone must be powered from the main unit for that specific zone. In the event of hardware failure, only the affected equipment must lock out and alarm to prevent an incorrect operation.
- Zone 1:

This zone will include all circuits of the section supplied from Incomer 1. Any arc detected in the circuit breaker or busbar compartment of these panels will trip Incomer 1, Bus Section 1 and the remaining feeders on the left-hand side of the board.

- Zone 2:
  This zone will include all circuits on the right-hand side of Bus Section. Any arc detected in the circuit breaker or busbar compartment of these panels will trip Incomer 2, Bus Section the remaining feeders on the right side of the board.

- Cable Compartment Zones: All feeders
  Each feeder cable compartment zone will extend from the feeder current transformer to the point of exit of the MV cable. Any arc detected in the cable compartment of these panels, will trip the relevant feeder only. Positioning of current transformers will be optimised to provide optimum current supervised cable compartment arc protection.

C3.4.8.2.2. Backup Busbar Protection: Busbar Blocking

To cater for backup busbar protection a single zone busbar-blocking scheme will be implemented on the Incomer and Feeder protection relays. Any out of zone fault on a feeder will be detected by an instantaneous element on that feeder relay and block the appropriate high-set element on the specific Incomer protection relay. The busbar blocking scheme will trip all circuit breakers connected to the board via a high speed lockout relay.

The busbar blocking scheme must be capable of clearing a busbar fault within a maximum of 200ms.

C3.4.8.2.3. Feeder Protection Relays: General Minimum Requirements

All incomer / feeder protection relays will be microprocessor-based multifunction protection relays, suitable for use on medium voltage cable distribution networks. The protection relays offered will provide for an integrated protection, control, interlocking and monitoring solution to allow optimum and seamless integration into the SCADA system. Each feeder bay protection control unit will provide protection, control, interlocking and monitoring functions for its individual feeder only and will act as a gateway for switchgear statuses to the SCADA system to eliminate excessive wiring to a separate RTU.

All feeder protection relays supplied will preferably be of a similar range and conform to the following minimum general requirements:

C3.4.8.2.3.1. Human Machine Interface and Communication Requirements

- Indication LED's clearly indicating relay healthy, relay alarm/ fail states, protection function starting and tripping states.
- Minimum of eight user configurable LED's, preferably programmable to latch, flash or reset under specific alarm conditions.
- Liquid crystal display to allow easy access to control functions, measured values and setting parameters.
- Front serial communication interface for use as PC interface to configure and change setting parameters on the relay.
- Rear communication port for connection to the SCADA system. All internal substation communications will comply with the IEC-61850 standard. External protocol requirements and communication infrastructure will be determined by the SCADA system requirements.
- Display of primary current, voltage and energy values on LCD.

C3.4.8.2.3.2. Protection Functionality

- 51-1 -Three-phase overcurrent protection with definite-time and IDMT (IEC) characteristic, low-set element
- 51-2 -Three-phase overcurrent protection with definite time characteristic, high-set element
- 50 - Three-phase overcurrent protection with definite time or instantaneous characteristic, high-set element
- 51N-1 -Non-directional ground-fault protection with definite-time and IDMT (IEC) characteristic, low-set element
- 51N-2 -Non-directional ground-fault protection with definite time characteristic, high-set element
- 50N - Non-directional ground-fault protection with definite time or instantaneous characteristic, high-set element
- CBF -Circuit Breaker Fail protection
- 95-1 –ARC protection (Integrated)
- 46 – Negative-sequence overcurrent protection for detecting unbalanced faults, which can be critical for motors and generators.

- 49 – Thermal overload protection using an IEC/IEEE thermal model to prevent overheating of conductors and equipment.
- 50G – Instantaneous ground fault protection using a dedicated sensor (if applicable).
- 79 – Reclosing function to automatically restore power after temporary faults, improving system reliability.
- 27 – Undervoltage protection to detect abnormal voltage dips that may indicate faults or instability.
- 59 – Overvoltage protection to detect dangerous voltage rises that can damage insulation and equipment.
- 67N – Directional ground fault protection (if included) for selective tripping in distribution networks with specific grounding schemes.
- 81O/81U – Over/Underfrequency protection to detect system instability and load shedding conditions.

C3.4.8.2.3.3. Control Functionality

- 51-1 -Three-phase overcurrent protection with definite-time and IDMT (IEC) characteristic, low-set element
- 51-2 -Three-phase overcurrent protection with definite time characteristic, high-set element
- 50 - Three-phase overcurrent protection with definite time or instantaneous characteristic, high-set element
- 51N-1 - Non-directional ground-fault protection with definite-time and IDMT (IEC) characteristic, low-set element
- 51N-2 - Non-directional ground-fault protection with definite time characteristic, high-set element
- 50N - Non-directional ground-fault protection with definite time or instantaneous characteristic, high-set element
- CBF -Circuit Breaker Fail protection
- 95-1 – ARC protection (Integrated)
- 46 – Negative-sequence overcurrent protection for detecting unbalanced faults, which can be critical for motors and generators.
- 49 – Thermal overload protection using an IEC/IEEE thermal model to prevent overheating of conductors and equipment.
- 50G – Instantaneous ground fault protection using a dedicated sensor (if applicable).
- 79 – Reclosing function to automatically restore power after temporary faults, improving system reliability.

- 27 – Undervoltage protection to detect abnormal voltage dips that may indicate faults or instability.
- 59 – Overvoltage protection to detect dangerous voltage rises that can damage insulation and equipment.
- 67N – Directional ground fault protection for selective tripping in distribution networks with specific grounding schemes.
- 81O/81U – Over/Underfrequency protection to detect system instability and load shedding conditions.

C3.4.8.2.3.4. Measurement Functionality

- Three phase RMS current measurement
- Three phase current demand measurement

C3.4.8.2.3.5. Condition Monitoring Functionality

- TCS - trip circuit supervision in both circuit breaker open and closed states and for both main and back-up trip coils.
- Circuit breaker wear monitoring.

C3.4.8.2.3.6. Inputs/ Outputs

- Minimum fifteen digital inputs, monitoring as a minimum circuit breaker status, earth switch status, circuit breaker racking status and external trip/ close commands. The contractor will however assess the additional requirements specified for each scheme in this specification and the Schedule for SCADA requirements from an IED perspective and provide the required number of inputs to conform to the specified requirements. Where more inputs are required, the supplier will offer additional means to provide the required number of inputs.
- Two high-speed power outputs for tripping the circuit breaker.
- Minimum four user configurable power outputs suitable for closing and inter-tripping circuit breakers.
- Minimum six user configurable signal outputs for alarm and busbar blocking protection purposes.

C3.4.8.2.3.7. Analogue Inputs

- Current transformer inputs will have optional 1A inputs with the following minimum thermal ratings:

Continuous:	4xIn
1s Short time:	100xIn
Dynamic half cycle:	250xIn

C3.4.8.2.3.8. Quality of Supply and Power Recorder

Installed one for each 11kV Incomer. Specification is as follows:

VECTO 3.4 Multifunction Wave Synchronised with Power Quality Analyser, built-in GPS, Wi-Fi, Cellular Modem & Antennae - 4m Ethernet Cable, Flash Drive, Flat Screwdriver, with 15m Coax Extension Cable & GPS Wall Mounting Bracket (Fitted on Each 11kV Incomer Panel). Time stamped sequence of event recording. Local time synchronisation via communication port. VECTO 3/3.4 All-inclusive Installation Kit - including connection wire; and installation accessories (Fitted on Each 11kV Incomer Panel). Allowing for linking to the SCADA system and include all cabling to ensure functionality. Bring Raw data on A Graphic User Interface of G100 RTU to Display power quality measures to 3x users' computers that's linked to the SCADA G100 RTU system. Display to also include but not limited to:

- Power Quality Monitoring: Real-time tracking of voltage and current harmonics up to 25 kHz, with advanced event detection and classification.
- Synchro phasor Data (PMU+): Visualization of synchro phasor measurements, including ultra-fast and accurate frequency estimations, even under distorted conditions.
- Grid Stability Analysis: Monitoring of oscillation phasors with 20 m.s update intervals, enabling detection and estimation of multiple oscillation modes simultaneously.
- Metering and Billing Information: Time-of-use tariffs, energy import/export data, and synchronized billing information for comprehensive energy management.

C3.4.8.2.4. Main Incomer Protection (MI): Specific Requirements

Main incomers (MI) are defined as the 2 x 11kV incomers from CSIR Outdoor 132/11kV Substation transformers.

C3.4.8.2.4.1. Main Incomer Protection Relay

In addition to the general requirements as specified under Paragraph 5.3, the following additional functionality is required for each Main Incomer:

The main incomer is to utilise the existing transformer scheme protection with additional protection supported by the SEL 751 relay which is as follows:

Protection Functions:

- 51-1 -Three-phase overcurrent protection with definite-time and IDMT (IEC) characteristic, low-set element
- 51-2 -Three-phase overcurrent protection with definite time characteristic, high-set element
- 50 - Three-phase overcurrent protection with definite time or instantaneous characteristic, high-set element
- 51N-1 -Non-directional ground-fault protection with definite-time and IDMT (IEC) characteristic, low-set element
- 51N-2 -Non-directional ground-fault protection with definite time characteristic, high-set element
- 50N - Non-directional ground-fault protection with definite time or instantaneous characteristic, high-set element
- CBF -Circuit Breaker Fail protection
- 95-1 –ARC protection (Integrated)
- 46 – Negative-sequence overcurrent protection for detecting unbalanced faults, which can be critical for motors and generators.
- 49 – Thermal overload protection using an IEC/IEEE thermal model to prevent overheating of conductors and equipment.
- 50G – Instantaneous ground fault protection using a dedicated sensor (if applicable).
- 79 – Reclosing function to automatically restore power after temporary faults, improving system reliability.
- 27 – Undervoltage protection to detect abnormal voltage dips that may indicate faults or instability.
- 59 – Overvoltage protection to detect dangerous voltage rises that can damage insulation and equipment.
- 67N – Directional ground fault protection for selective tripping in distribution networks with specific grounding schemes.
- 81O/81U – Over/Underfrequency protection to detect system instability and load shedding conditions.

Statistical Measurements:

To be displayed locally and on SCADA: Three-phase RMS Voltage (V), Total Active Power (P), Total Reactive Power (Q), Power Factor (pf), Active Power demand, Reactive Power Demand, Four quadrant Energy (kWhr and KVArhr) measurement.

Power Quality measurement:
Using the Vecto II, provide Voltage harmonic distortion measurement and current harmonic distortion measurement up the 13th harmonic.

Signal Outputs:
Additional binary inputs will be required to achieve interlocking requirements. The supplier will assess binary input requirements based on his protection and control scheme design offered and ensure that a sufficient number of binary inputs are provided to conform to the specification.

Protection Functions:
Additional power or signal outputs will be required to achieve interlocking requirements. The supplier will assess output requirements based on his protection and control scheme design offered and ensures that a sufficient number of outputs are provided to conform to the specification.

Analogue Inputs:
Four VT inputs are required for directional over current and earth fault protection. Current inputs will be as specified for the feeder protection.

C3.4.8.2.5. Bus Section Protection (BS): Specific Requirements

C3.4.8.2.5.1. Bus Section Protection Relay

Where bay control type feeder protection relays are offered, three circuit breaker control modes will be possible as detailed below. Tripping commands will be issued directly to the circuit breaker trip coil

Protection Functions

- 51-1 -Three-phase overcurrent protection with definite-time and IDMT (IEC) characteristic, low-set element
- 51-2 -Three-phase overcurrent protection with definite time characteristic, high-set element

- 50 - Three-phase overcurrent protection with definite time or instantaneous characteristic, high-set element
- 51N-1 -Non-directional ground-fault protection with definite-time and IDMT (IEC) characteristic, low-set element
- 51N-2 -Non-directional ground-fault protection with definite time characteristic, high-set element
- 50N - Non-directional ground-fault protection with definite time or instantaneous characteristic, high-set element
- CBF -Circuit Breaker Fail protection
- 95-1 –ARC protection (Integrated)

Digital Inputs:

- Additional Binary Inputs might be required to achieve interlocking requirements. The supplier will assess binary input requirements based on his protection and control scheme design offered and ensures that a sufficient number of binary inputs are provided to conform to the specification.

Signal Outputs:

- Additional power or signal outputs might be required to achieve interlocking requirements. The supplier will assess output requirements based on his protection and control scheme design offered and ensures that a sufficient number of outputs are provided to conform to the specification.

C3.4.8.2.6. Control Requirements

Where bay control type feeder protection relays are offered, three circuit breaker control modes will be possible as detailed below. Tripping commands will be issued directly to the circuit breaker trip coil.

C3.4.8.2.6.1 Operation of the circuit breaker via the Bay Control relay (all circuits):

- With the circuit breaker racked into the test position and the Bay Control Relay selected to “Local”, circuit breaker open and close commands can be initiated from the Bay Control Relay. Delayed operation will be required.

- With the circuit breaker racked into the service position and the Bay Control Relay selected to “Local”, a circuit breaker open and close command can be initiated from Bay Control Relay. Delayed operation will be required.
- With the Bay Control Relay selected to ‘local’, no SCADA control will be possible.
- Local opening and closing shall be carried out at the switchgear and shall generally only be used with the circuit breaker in test mode. Where specified a plug-in pendant type control shall be provided so that operators may control switching from a distance of 6 metres.

C3.4.8.2.6.2. Remote operation via SCADA:

- With the circuit breaker racked into the test position and the bay control relay selected to “Remote”, circuit breaker open and close commands can be initiated via the SCADA System. No delayed operation will be required.
- With the circuit breaker racked into the service position and the bay control relay selected to “Remote”, circuit breaker open and close commands can be initiated via the SCADA System. No delayed operation will be required.
- With the Bay Control Relay selected to “remote”, no local closing operations will be possible. Provision will be made for an emergency trip, which will not depend on the local / remote selection.

C3.4.8.2.6.3. Interlocking requirements

In addition to the minimum interlocking requirements the following interlocking will be catered for, preferable integrated into the protection relays, or alternatively electrically hardwired. Under all circumstances interlocking conditions will be clearly displayed.

- It will not be possible to close any circuit breaker in the service position if the relevant cable earth switch is not open.
- It will not be possible to close any circuit breaker in the service position if the relevant trip circuit is faulty.
- Interlocks to also include preventing the transformers operating parallel (To be confirmed by Engineer).

C3.4.8.2.6.4. Instrumentation transformers

The supplier shall ensure that the current and voltage transformer specifications comply with the intended loading. The supplier shall liaise with the employer to ensure the compatibility of the current transformers into the overall protection scheme.

The supplier should take note of the following specific requirements:

- Busbar voltage transformers are specified equipped with racking indication switches.
- Busbar voltage transformers shall be of three-phase, five-limb core construction. The voltage factor shall be 1.9."

C3.4.8.2.7. DC Requirements

C3.4.8.2.7.1. Switchgear

One 110V DC supply systems will be provided per switching station, in line with the customer's requirements. The DC supply system shall consist of a battery charger with a set of batteries and a DC distribution board. The charger and self-contained batteries shall comply with SANS1652 & SANS1632.

The supplier should take note of the following specific requirements:

- Provision will be made to include all battery charger alarms on the SCADA system by either incorporating them into an appropriate protection relay with spare digital inputs, or by using a dedicated RTU for general substation alarms. DC supply alarms may be grouped into a minimum of two groups.
- The battery charger and DC distribution will be incorporated into one floor standing panel.
- Provision must be made for support structures for the cables underneath the DC panel up to the point that they enter the main cable racks in the trench.
- The panel shall be IP4X rated

C3.4.8.2.8. AC Distribution Requirements

The new AC distribution system will consist of the following:

- Supply and install one cable supply from the local miniature substation to the New AC Board and also the existing AC board in the control room.
- The AC distribution board will have a 25kA minimum fault rating.
- The circuit breakers, isolators and gland plate will be chosen and manufactured as such that the cables can be easily terminated.
- Circuit breakers in series must be graded properly.
- Earth leakage to be provided for the plug circuits.

- The board shall be IP54 rated.
- Switchgear panel heaters and other equipment will be supplied from the new 415/240V AC distribution board.

C3.4.8.2.9. Documentation Requirements

The following documentation requirements form part of the SOW and deliverables:

- Functional design specification
- Approved for constructions drawings
- Protection relay configuration files based on paragraph 15.3 (ii) before FAT commence
- Pre-FAT report and results
- FAT file containing all FAT reports, marked up drawings, punch lists before equipment can be shipped
- SAT files containing all SAT reports and as commissioned drawings
- Operating and maintenance manuals

C3.4.8.2.10. **Protection Settings requirements**

Protection relay settings consist of two components:

a) **Protection coordination settings where a fault level study is conducted to determine the following:**
   - Over-current and earth fault protection curves, pickup levels and time settings
   - Line impedance zone and time settings
   - Auto re-close time coordination settings for transient faults

b) **Protection relay configuration settings that is required to set up the protection relay for correct operation. These include:**
   - Settings required for correct operation of protection functions
   - Settings required for correct functional operation of control, metering and interlocking functions
   - Protection coordination settings are included in the scope and shall remain the responsibility of the contractor and must be approved by the Engineer and CSIR. Application of all logics, configurations and settings will be the responsibility of the relay supplier or his commissioning engineer which will be employed by the contractor who will remain ultimately responsible.

C3.4.8.2.11. Switchgear factory acceptance testing (FAT)

Each board will go through a proper FAT process. The employer or their nominated representative will witness the FAT procedure and approve all FAT documentation before approval will be given to transport equipment to site. The following FAT procedure will be applicable:

Responsibilities

FAT will be conducted within the following framework:

- The switchgear supplier will be primarily responsible for conducting the FAT and to compile all FAT documentation.
- The employer or his representatives will only witness FAT as a Quality Control function and does not take responsibility for the correctness of the equipment supplied.
- The switchgear supplier will remain responsible for the rectification of any defects found during FAT or SAT.

Pre-Fat Checks:

The switchgear supplier will complete all pre-FAT checks and notify CSIR at least 2 weeks in advance before checks will commence and when the pre-FAT documents will be completed and ready for inspection. The employer might request to witness specific tests. Once these tests are completed, the employer will verify the test results and request to witness specific items.

Pre-FAT checks will include, but not be limited to the following:

- Ring out of all wiring,
- Insulation tests on all wiring circuits,
- Equipment nameplate verification based on a comprehensive equipment list,
- Marked up schematic diagrams and equipment lists,
- Circuit breaker test results, including pressure test, vacuum bottle test, speed tests, trip and close coil tests, mechanical checks,
- Mechanical operation and alignment checks,
- Apply DC and check operational functionality,
- Current transformer magnetization curves, ratio and polarity checks with the CT installed and wired into the panel,
- Voltage transformer polarity and ratio checks with the VT installed and wired into the panel,
- Provide and upload protection relays with approved logics and configuration settings. Protection settings will be provided by CSIR.

Fat Tests:

On completion and approval of all pre-FAT documentation, the switchgear supplier will commence with the functional testing of protection schemes. CSIR will be notified at least 2 weeks in advance before FAT commences to allow The Employer or their representative to witness these tests. Once these tests are completed, The Employer will verify the test results and request to witness specific items.

FAT tests will include but not be limited to:

- Extensive functional testing of each panel protection and control scheme to prove relay configuration, wiring, logics, protection and control philosophies,
- Secondary injection to prove relay configuration and correct application of protection settings,
- Overall scheme tests, i.e. Busbar Arc protection, Busbar Blocking, Interlocking etc.
- Where required, scheme testing will be done with primary injection.

C3.4.8.2.12. Site acceptance testing (SAT)

The switchgear supplier will be responsible for SAT on the switchgear, the rectification of any defects (and the associated cost) during SAT will remain the responsibility of the switchgear supplier.

The supplier shall provide assistance during the hot commissioning phase and shall be responsible for all on-line measurement directly following hot commissioning. Commissioning assistance will be provided by either one of the following:

- The design engineer primarily responsible for the design to date, or
- Competent suitable qualified commissioning technician that will be approved by the employer.
- Sub-contractors providing commissioning assistance must be approved by the engineer prior to any commissioning taking place.
- Commissioning support shall be included in the tender price.

C3.4.8.2.13. Switchgear training

The supplier will be required to provide equipment specific and commissioning training on equipment as called for below.

- Various training requirements as specified in this specification might be required to be combined to provide a proper overview off all equipment supplied.
- CSIR will provide a training venue and the switchgear supplier shall provide for all training equipment required.

- CSIR will provide at least 3 weeks' notice prior to commencement of training courses.
- The supplier shall provide each trainee with a certificate indicating that the trainee has been introduced and can operate, maintain, setup and test the relevant equipment trained for.

Switchgear Training

The supplier shall provide unit rates, based on one day on site, for the following:

- Demonstrate and train personnel on mechanical functions such as racking, interlocking, earthing and any other requirements of the panels.
- Explain all relay indications and interlocking functions.
- Installed panels will be used for training purposes.

Protection Training

The supplier shall provide unit rates, based on three days on site, for the following:

- Training on the setup, programming, testing and commissioning of the protection relays and associated equipment,
- Provide for an operators training course covering the operation and programming of the protection equipment offered,
- Provide training on the protection and control schemes implemented,
- Delegates for the training course will be limited to a maximum of 5 people and the supplier shall provide for 3 consecutive days to provide 3 one-day courses.

C3.4.9. SCADA System

The scope of the contract will consist of the supply, installation and commissioning of a complete SCADA system for the MV Switching Station complete with associated equipment, fully configured, tested and commissioned in accordance with the specification. The SCADA system shall also but not limited to be equipped to accommodate the HV protection schemes and the Mini Subs which shall be installed in the subsequent phases of the project.

A GSM Module with modem shall be supplied and installed to establish remote communication, this is to include the setup on the client's computers. The contractor shall be responsible for the supply, installation and commissioning of the interface. The protocol internal to the substation (between the protection and control IEDs and the substation IED / HMI) will comply with the IEC-61850 and DNP3 standard.

C3.4.9.1. General requirements

C3.4.9.1.1. SCADA Supply & Delivery

The supplier shall supply one complete SCADA system which shall include but not be limited to:

- All SCADA Software as required
- 19”floor standing swing frame cabinet
- HMI Screen with Keyboard
- F.A.T. One day (RTU / Gateway Only)
- ARRM (Automatic File Retrieval from IED's) S/W Module
- STORE, CRATE AND WRAP Cabinet
- 10 port SS hardened ethernet switch; LC, RJ45; 4U
- GE G100 GATEWAY; 48 VDC
- G100 110 / 48VDC Power Supply
- X21/RS422 Port Isolator for FOX 615 port connection
- ETHER 64 Status Input MODULE CONFIG 1
- ETHER Combi Card MODULE
- SEL-2407 Satellite-Synchronized Clock (Clock + Antenna + Surge Suppressor + 25m Cable).
- GSM Module with Modem and Establishment of Remote Communication and setup on client’s computers (3 Users)
- Testing, Configuration, setting, mapping and Commissioning of all the SCADA and communication Systems
- Intermediate Distribution Frame fitted with 2x80way with 20x 10 pair krone blocks
- Uninterruptible Power Supply. Alternatively supplied from the DC system provided provision is made for the additional load in the sizing calculations.
- Patch Panel including all fibre leads
- GPRS interface
- All Engineering, configuration, testing & commissioning
- Training
- As built documentation OEM documentation

C3.4.9.1.2. Design, Install, Program, Testing & Commissioning

- The supplier shall design, install, program, test and commission the entire substation SCADA system. All commissioning and testing required under this project is included in

the scope of the successful supplier and shall be performed in accordance with the requirements of the relevant IEC, CSIR and other related specifications and guidelines.

- Provision will be made to include, but not be limited to, battery charger, feeders, metering, power factor correction and AC/DC controls, alarms and indications on the SCADA system by either incorporating them into an appropriate protection relay with spare digital inputs, or by using a dedicated RTU for general substation alarms.
- Include for all costs to re-configure, re-programme and extend the central SCADA control.

C3.4.9.1.3. Equipment

All equipment required for the complete installation is included is in the scope of the successful supplier, this includes all but is not limited to fibre optic cable, cables, circuit breakers, terminal strips, joints, terminations, etc.

C3.4.9.1.4. As-builts

The successful supplier shall provide comprehensive as-built documentation upon completion of the project.

C3.4.9.1.5. Compliance with the specification

The Supplier shall submit a document stating section by section whether they comply with the specification and explaining any deviations from the specification.

C3.4.9.1.6. Labelling (General)

All cubicles, equipment and cables shall be clearly and permanently labelled. A uniform method of labelling shall be followed across the whole system. Each equipment item shall contain the original manufacturer's marking including the manufacturer's name, equipment type, model number, and serial number. In cases where this is not available an information plate must be manufactured attached to the device

C3.4.9.2. SCADA Technical requirements

C3.4.9.2.1. Computer hardware

- Rack-mounted PC, chassis and server backplane
- On-board SATA RAID controller
- Latest technology CPU
- Min 4Gb ram
- 2 x 100GB SATA SSD in RAID 1 configuration
- 8x DVD+/-RW SATA drive
- Appropriate disk drive
- On-board dual Gigabit electrical ethernet connections

C3.4.9.2.2. Software

Set of software as required by the substation automation system:

- Microsoft Windows 11 Pro 64bit.
- Relevant OEM supported SCADA Software for Multilin G100 Advanced Substation RTU / Gateway or similar.
- Any other hard or software to complete installation.

C3.4.9.2.3. Communication Panels

The computers shall be mounted in 600mm wide, 600mm deep, 21U panels with front, rear and side access, glass front doors, bottom entry, painted goose grey including wiring terminals, MCB's, PVC trunking and earth bars with active cooling and an IP41 protection rating completely wired and tested. Apart from the items mentioned above, the following shall be mounted in these panels:

- One Ruggedcom Ethernet
- MGE Pulsar M3000 3kVA UPS for SCADA purposes
- Additional AC supply point via a suitable circuit breaker from the MGE Pulsar M3000 3kVA UPS to provide an uninterruptable supply to an external cabinet housing the Ethernet Communications Backbone.
- All switches and fibre patch boxes for a complete installation.
- GPRS interface equipment complete.
- A key lockable supervisory on/off switch to be connected to the bus section relay in each substation.

C3.4.9.2.4. Communication Equipment

The Ruggedcom Ethernet Switches RSG2100 shall have dual high-power AC or DC supply provided the additional load is included in the sizing calculations, multimode ST type glass fibre ports for connection to IED's within the substation, dual gigabit ports (2 x 10/100/1000mbit/s TX RJ45) for switch-to-switch connections within a substation.

C3.4.9.2.5. Fibre Optic Cable

The fibre optic cables connecting the panel IEDs and the switches shall be ruggedised glass fibre with connectors as dictated by the IED). The installation of the fibre is part of this contract.

C3.4.9.3. SCADA Functional Description

The successful supplier shall compile a functional design specification and once approved, followed by a detail design specification detailing the functionality for acceptance & approval by the client.

C3.4.9.3.1. SCADA Functional design specification (FDS)

The successful supplier shall generate a functional design specification (FDS) document describing in sufficient detail how their system intends to offer the functionality specified and highlighting any aspect where the system offered deviate from the specification. The purpose of the FDS is for the supplier to prove that the proposed system complies with the minimum system requirements and/or to highlight where the system offered will provide the specified functionality in a different fashion.
The document will detail the overall system composition, proposed communication system design, software configuration and related equipment to ensure compliance with the specification.
The FDS document shall be to the satisfaction of and be approved by the CSIR engineer before the detail design specification (DDS) is compiled.
The FDS shall include (but not be limited to) the following topics:

<u>Project Overview</u>

- Scope of Supply
- Detailed proposed Project Plan, including Milestones, FAT, SAT, etc.
- System Overview
- System Security
- Network Security/ Remote Access

<u>System Configuration</u>

- Communication Servers
- Master station equipment (SCADA Server, printers, etc.)
- Master Station software
- Substation Communication
- Substation SCADA equipment (PC, printer, RTUs / relays / IEDs / VSDs)
- Interfacing with legacy equipment (substation)
- Interfacing with equipment from another substation

System Functional Description

- Log-on page
- Overview
- Display pages/ Screens
    - Design
    - Page Layouts
    - Navigation
    - Switching / Control Functions
    - Events
    - Alarms
    - Analogues
    - Reports
    - Trending
    - Graphical Displays
    - Archiving
    - Security
    - Authorisation Rights
    - Backups
    - Training
- Proposed Training Schedules
- Description of proposed content per module

C3.4.9.3.2. SCADA DETAIL DESIGN SPECIFICATION (DDS)

On acceptance of the FDS, the successful supplier shall generate a detail design specification (DDS) describing in detailing the functionality and deliverables of the system to be supplied. The

purpose of the DDS is to document in detail exactly what the supplier will supply under this contract in terms of hardware, software, functionality, signal mapping, training, documentation, etc.
The DDS will also be used as the standard against which the factory acceptance testing & site acceptance testing will be performed / measured.
The DDS document shall be to the satisfaction of the CSIR engineer and shall be approved by the engineer before the SCADA system is configured / programmed.
The DDS shall include (but not be limited to) the following topics:

Project Overview (As provided in FDS, but with latest updates)

- Scope of supply
- Detailed final Project Plan including Milestones, FAT, SAT, etc.
- System Overview
- System Security
- Network Security/ Remote Access

System Configuration (As provided in FDS, but with latest updates and in more detail)

- Communication Servers
- Master station equipment (SCADA Server, printers, etc.)
- Master Station software
- Substation Communication
- Substation SCADA equipment (PC, printer, RTUs / relays / IEDs / VSDs)
- Interfacing with legacy equipment (substation)
- Interfacing with equipment from other substations
- Signal mapping for each Cable feeder protection, metering, battery charger, AC/DC panel and PFC.

System Functional Description (As provided in FDS, but with latest updates and in more detail)

- Log-on page
- Overview
- Display pages/ Screens
    - Design
    - Page Layouts
    - Navigation
    - Switching / Control Functions
    - Events

- Alarms
- Analogues
- Reports
- Trending
- Graphical Displays
- Archiving
- Security
- Authorisation Rights
- Backups

Design Drawings

- Fibre connection diagrams
- Wiring diagrams
- Cabling diagrams and cable blocks

Training

- Final Training Schedules
- Description of final content per module

C3.4.9.4. Other Requirements

C3.4.9.4.1. Equipment Installation in Enclosures

Subsystems and components shall be easily maintainable. It shall be possible to remove items of equipment for maintenance with minimal interference with respect to other equipment. Components which generate a lot of heat shall be adequately spaced from their mounting boards and from other components.

All components shall be adequately supported and secured. Components shall not be mounted directly on wiring terminal blocks unless adequately protected from damage.

C3.4.9.4.2. Cabling and Wiring

All multi-core cables shall be manufactured in accordance with SABS 1507-1990 (or SABS 150-1970) and visibly identified as of flame retardant, low toxicity types. Where a cable is to be installed in a location that may render it liable to mechanical damage, it shall be protected by wire armouring, or by other approved means. All cabling shall be neatly run and fitted in or upon such cable trays, trenches, ducts or conduits as may be appropriate to the layout and equipment.

The scope of the contract will consist of providing a floor mounted metering panel with 4 x class 0.5 electricity consumption meters and associated communication equipment, fully configured, tested and commissioned in accordance with the specification. There will be one meter for each incomer and one for summation metering of the 3 incomers.

C3.4.9.4.3. Warranty

The supplier will provide a warranty for a period of twenty-four months after handover of the system to CSIR and shall provide the following services as part of the warranty support during this period: Repair or replace all faulty components damaged by normal operation or during first 24 months of operation. First line maintenance by trained and competent CSIR personnel. Respond to call outs as follows:

- Substation equipment interface and communication faults. Modules to be replaced within 5 working days of fault reports

Provide user support consisting of telephonic support of users who have successfully attended the relevant training course. The supplier shall regard the training courses as a method of minimising their user support costs during this period. The response time for user support requests shall be no longer than eight working hours.

C3.4.9.4.4. Spares

The supplier shall provide a list of spares for commissioning and maintenance within the scope of this project. The spares holding shall take into account the probability of failure as well as the effect on the system should a spare item not be available.
The supplier shall also provide prices of spares with a guaranteed availability of ten years.

C3.4.9.4.5. Maintenance

CSIR requires a system where the maintenance requirement is minimal.
Hardware maintenance shall be no more than what is required for a normal personal computer installation and the communication equipment shall be virtually maintenance free.
Apart from normal back-ups and limited software upgrades (vendor specific and operating systems) no maintenance on the real-time database shall be necessary once the systems is fully configured an operational.

C3.4.9.4.6. Training

The supplier shall provide training that shall be directly applicable to the actual equipment and software to be provided as part of the system offered. Generalised training based upon roughly similar equipment shall not be accepted. Training shall be provided at the following levels:

Engineering / System Administrator level.

Full access to the system & database, including system configuration, programming, testing & commissioning, to enable the authorised engineer / administrator to add, delete and make changes to the system as required.

Operational & Maintenance level.

Training as required to enable personnel to operate the system confidently and to identify basic problems in order to perform first line maintenance on the system.

Executive level.

A basic overview with sufficient information to provide management with a clear understanding of the system functioning & capabilities.
The supplier shall specify the following details of all courses included within the scope of the offer:

- Course Title
- Description of course content
- Duration of course
- Maximum number of attendees
- Prerequisites for attendees
- Location of course

The courses shall be run in a disciplined fashion to ensure that CSIR personnel who successfully complete the training courses shall be deemed to be competent.

C3.4.9.4.7. Documentation to be submitted

The supplier shall supply all documentation including manuals and drawings related to the design, installation and commissioning of the systems and equipment supplied as part of the contract. All drawings submitted to CSIR shall be accompanied by an agreed drawing transmittal advice together with a master drawing register. The training, operating and maintenance manuals shall be cross referenced and shall be the correct manual for the equipment installed and not for similar equipment items or systems. CSIR reserves the right to approve the format and content of all

documentation. The supplier shall verify the quality of the document to ensure fitness for purpose both technically and typographically.

Documentation Software

The system documentation such as diagrams, functional specifications, training manuals, etc. shall be made available in commonly used software formats.

Documentation Synopsis

The supplier shall provide, together with his offer shall provide an overview of the documentation to be supplied. This shall describe the structure and content of the documentation to be provided together with the offer. A list of required documentation is given below in this section.

Documents

The “as built” documents shall be updated and submitted to CSIR not later than one month after the successful completion of the site acceptance test and system hand-over. The documents shall be supplied on electronic media at that stage. The final payment certificate will not be processed until it has been submitted.

Required Documents

Document Type
System Functional & Detail Specifications
System training manuals
System test specification
Commissioning sheets and test certificates
Compliance certificates
Calibration certificates
Computer hardware manuals
All software copies and passwords
Computer operating system manuals
Computer database user manuals
System user manuals
System maintenance manual and 3-year maintenance agreements.
Communication training manual

Communication user manual
Communication configuration diagrams
Warranty and Letter of Guarantee from Supplier.
As-built Drawings

Modifications

The supplier shall provide additional and amended pages sufficient for all copies of manuals and drawing sets to ensure that all sets are complete. Amendment pages listing modifications and modification history shall be included in all documents. All changes to the system made during the warranty period shall be reflected in the documentation.

C3.4.9.5. SCADA Testing

The supplier shall ensure that the system and its parts are fully tested before delivery and installation and shall then perform a final test after commissioning but prior to handover.
The testing shall consist of original subsystem tests, followed by a factory acceptance test (FAT) at the supplier's premises, finally culminating with the site acceptance test (SAT) in which the system as a whole is tested. The supplier shall give CSIR notice in writing two weeks prior to any formal testing.

Factory Acceptance Tests

Full factory acceptance tests shall be performed on subsystems during the manufacturing period. In this case full factory acceptance will be required on the complete individual substation SCADA system which will be shipped directly to site after their individual (subsystem) FAT.

Site Acceptance Test

The system SAT shall be performed on all equipment in the scope of supply. The equipment shall be installed in the final location for its planned operation prior to performance of the SAT.
The system SAT shall be conducted after all the various elements of the system have been installed in the field and have all successfully completed their individual subsystem SAT's. The system SAT shall be performed with equipment in the locations in which they will eventually operate.
This test shall demonstrate that the overall design of the system meets the functional and performance requirements of the specification in the field, using the actual communications network and including equipment supplied by others, to which the system is designed to interface.

Interface testing to the remote-control room shall be performed jointly with the responsible CSIR engineer. The contractor shall take full responsibility for the interface at the substation level while CSIR will take responsibility for the interface at the central control room level.

Final System Acceptance

CSIR will accept the system by means of a formal take-over certificate when:

- The system and all items of equipment have successfully completed all the specified tests.
- All failures, problems and reservations noted during the tests have been corrected to CSIR's satisfaction or a plan of corrective action has been agreed between CSIR and the supplier.
- Hand over documentation and as built drawings have been submitted.

C3.4.10 METERING - (REFER TO C3.4.8.2.3.8. FOR QUALITY OF SUPPLY METERING REQUIREMENTS)

C3.4.10.1. LV Metering General requirements

C3.4.10.1.1. Supply & Delivery

- The supplier shall utilise existing meters for the LV Side of the Mini sub where its feeding the building 26 and other connected buildings from the existing LV Board. The contractor is to ensure that they decommission, and commission coupled with completing all engineering, configuration and testing.

C3.4.10.1.2. Design, Programming, Testing & Commissioning

The supplier shall configure and program the individual meters and communication devices as per CSIR's specific requirements. The meters shall be commissioned as prescribed by SANS 474.2006.

Following the successful testing & commissioning of the individual electricity consumption meters, full overall functionality of the complete metering system shall be proven to CSIR.

All commissioning and testing required under this project is included in the scope of the successful supplier and shall be performed in accordance with the requirements of the relevant IEC, CSIR, and other related specifications and guidelines.

Please note that the complete system offered shall be designed, tested & commissioned in accordance with the requirements of SANS 474.2006 Code of practice for electricity metering and shall comply with the requirements of the said code

C3.4.10.1.3. Equipment

All equipment required for the complete installation is included is in the scope of the successful supplier, this includes all but is not limited to circuit breakers, terminal strips, test block, joints, terminations, bonding etc.

C3.4.10.1.4. As built

The successful supplier shall provide comprehensive as-built documentation upon completion of the project.

C3.4.10.1.5. Compliance with the Specification

The Supplier shall submit a document stating section by section whether they comply with the specification and explaining any deviations from the specification.

C3.4.10.1.6. Labelling

All cubicles, equipment and cables shall be clearly and permanently labelled. A uniform method of labelling shall be followed across the whole system. Each equipment item shall contain the original manufacturer's marking including the manufacturer's name, equipment type, model number, and serial number. In cases where this is not available an information plate must be manufactured attached to the device

C3.4.10.2. Metering Technical requirements

All equipment supplied under this specification shall comply with the requirements of this section. The Supplier shall, nevertheless, ensure that all equipment and software supplied is suitable for the intended purpose and environment. The Supplier shall furthermore accept all responsibility for the satisfactory quality, design and workmanship of the System and all equipment of which the system is comprised, whether manufactured by him or not.

The equipment shall be designed to facilitate preventative and corrective maintenance and operation with high availability for a period of at least ten years. The design shall incorporate every reasonable precaution and provision for the safety of all those concerned in the operation and maintenance of the equipment supplied. The equipment shall not generate any type of interference especially electromagnetic interference at a level which could be detrimental to the performance of other equipment or which could cause annoyance or discomfort to personnel.

All equipment shall be designed to take into account the provisions of local statutory regulations, in particular the Occupational Health and Safety Act 85 of 1993, as amended. All metal equipment enclosures and the metalwork of desks shall be securely bonded to the earth network at the location concerned. No equipment shall contain any material/substance that will constitute a health hazard to personnel at any time.

C3.4.10.2.1. Electricity Consumption Meters

All new electricity consumption meters supplied where applicable under this contract shall comply with or exceed the following technical requirements:

- Accuracy: Class 0.5S (kWh)
  Class 1.0 (kvarh)
- Voltage: 3 x 57.5/100…240/415V
- Current: 1//5A
- Tariffs: 32 time of use registers
  08 Maximum demand registers
  5 Co-incident demands
  2 Sliding demands
  12 Seasons
  24 Season change over dates
  96 Switching times
  64 Exclusion dates
- Other data: Instantaneous values
- Outputs: 4 input, 4 output contracts
- Standard: IEC 62052 & IEC 62053
- Data output: LCD, communication module optional
- Display: 2 lines, 16 digit liquid crystal display
  Display while un-powered
- Figure height: 8 mm
- Dimensions: Height: 279mm
  Width: 170mm
  Depth: 81mm

C3.4.10.2.2. Communication

Each of the meters supplied should be equipped with a dial-up modem under this specification. The external communications network and the communications interface are excluded.
It shall also be able to fit a GSM/GSRS module to the meters for communication purposes.

C3.4.10.2.3. Metering Cabinets (general)

All cabinets supplied under this contract where applicable will meet with the following specifications. The cabinets shall be of sound construction and uniform appearance throughout the works and shall be manufactured from steel sheet of adequate thickness. They shall be protected against the entry of vermin, dust and insects (IP41 rating). Generally, access to cubicles shall be from the front, unless otherwise approved.
Cubicles shall be suitable for cable entry from both top and bottom entry. The cabinets shall allow for a removable plate to allow access to the bottom or the gland plate in order to facilitate cable installation and maintenance.
Cabinets shall preferably be of the 19inch rack floor standing type. All bolts, nuts and brackets required to fit the panel must be included for in the unit rate.
Provision must be made for support structures for the cables underneath the metering panel up to the point that they enter the main cable racks in the trench.

C3.4.10.3. Metering Functional Description

The successful supplier shall compile a functional design specification (FDS) and once approved, followed by a detail design specification (DDS) detailing the functionality for acceptance & approval by the client.

C3.4.10.3.1. Functional Design Specification (FDS)

The successful supplier shall generate a functional design specification document describing in sufficient detail how their system intends to offer the functionality specified and highlighting any aspect where the system offered deviate from the specification. The purpose of the FDS is for the supplier to prove that the proposed system complies with the minimum system requirements and/or to highlight where the system offered will provide the specified functionality in a different fashion.
The document will detail the overall system composition, proposed communication system design, software configuration and related equipment to ensure compliance with the specification.
The FDS document shall be to the satisfaction of and be approved by the CSIR Engineer before the (DDS) is compiled. The FDS shall include (but not be limited to) the following topics:

Project Overview

- Scope of Supply
- Detailed proposed Project Plan, including Milestones, FAT, SAT, etc.
- System Overview

System Configuration

- Substation Power Plant Configuration
- Substation Communication
- Substation Metering equipment
- Meter programming & tariffs

System Functional Description

- Log-on page
- Overview
- Display pages/ Screens
    - Design
    - Reports
    - Graphical Displays
    - Archiving
    - Security
    - Authorisation Rights
    - Backups

Training

- Proposed Training Schedules
- Description of proposed content per module

C3.4.10.3.2. Detail Design Specification (DDS)

On acceptance of the FDS, the successful supplier shall generate a DDS describing in detail the functionality and deliverables of the system to be supplied. The purpose of the DDS is to document in detail exactly what the supplier will supply under this contract in terms of hardware, software, functionality, training, documentation, etc.

The DDS will also be used as the standard against which the FAT & SAT will be performed / measured.

The DDS requirements are the same as for SCADA (detailed above).

C3.4.10.4. Other Requirements

C3.4.10.4.1. Identification

All equipment shall be clearly and permanently labelled as per. A uniform method of labelling shall be followed across the whole system. Each equipment item shall contain the original manufacturer's marking including the manufacturer's name, equipment type, model number, and serial number. In cases where this is not available an information plate must be manufactured attached to the device. All junction boxes shall include a terminal allocation list in a visible and accessible position.

C3.4.10.4.2. Equipment Installation in Enclosures

Subsystems and components shall be easily maintainable. It shall be possible to remove items of equipment for maintenance with minimal interference with respect to other equipment. Components which generate a lot of heat shall be adequately spaced from their mounting boards and from other components.
All components shall be adequately supported and secured. Components shall not be mounted directly on wiring terminal blocks unless adequately protected from damage.

C3.4.10.4.3. Wiring

All multi-core cables shall be manufactured in accordance with SABS 1507-1990 (or SABS 150-1970) and visibly identified as of flame retardant, low toxicity types. Where a cable is to be installed in a location that may render it liable to mechanical damage, it shall be protected by wire armouring, or by other approved means. All cabling shall be neatly run and fitted in or upon such cable trays, trenches, ducts or conduits as may be appropriate to the layout and equipment.

C3.4.10.4.4. Testing

The supplier shall ensure that the system and its parts are fully tested before delivery and installation and shall then perform a final test after commissioning but prior to handover.
The testing shall consist of original subsystem tests, followed by a FAT at the supplier's premises, finally culminating with the SAT in which the system as a whole is tested. The supplier shall give CSIR notice in writing two weeks prior to any formal testing.

<u>Factory Acceptance Tests</u>

Full factory acceptance tests shall be performed on subsystems during the manufacturing period. In this case full factory acceptance will be required on the complete substation metering system which will be shipped directly to site after their individual (subsystem) FAT.

Site Acceptance Test

The system SAT shall be performed on all equipment in the scope of supply. The equipment shall be installed in the final location for its planned operation prior to performance of the SAT.

The system SAT shall be conducted after all the various elements of the system have been installed in the field and have all successfully completed their individual subsystem SAT. The system SAT shall be performed with equipment in the locations in which they will eventually operate.

This test shall demonstrate that the overall design of the system meets the functional and performance requirements of the specification in the field, using the actual communications network and including equipment supplied by others, to which the system is designed to interface.

Final System Acceptance

CSIR will accept the system by means of a formal take-over certificate when:

- The system and all items of equipment have successfully completed all the specified tests.
- All failures, problems and reservations noted during the tests have been corrected to CSIR's satisfaction.

C3.4.10.4.5. Warranty

The supplier shall undertake to provide a warranty for a period of twenty-four months after handover of the system to CSIR. The supplier shall provide the following services as part of the warranty support during this period. Repair or replace all faulty components damaged by normal operation or during first 24 months of operation. First line maintenance by trained and competent CSIR personnel.

Respond to call outs as follows:

- Switching station equipment interface and communication faults. Modules to be replaced within 5 working days of fault reports.

Provide user support consisting of telephonic support of users who have successfully attended the relevant training course. The supplier shall regard the training courses as a method of minimising their user support costs during this period. The response time for user support requests shall be no longer than eight working hours.

C3.4.10.4.6. Spares

The supplier shall provide a list of spares for commissioning and maintenance within the scope of this project. The spares holding shall take into account the probability of failure as well as the effect on the system should a spare item not be available.
The supplier shall also provide prices of spares with a guaranteed availability of ten years.

C3.4.10.4.7. Maintenance

CSIR requires a system where the maintenance requirement is minimal.
Hardware maintenance shall be no more than what is required for a normal personal computer installation and the communication equipment shall be virtually maintenance free.
Apart from normal back-ups and limited software upgrades (vendor specific and operating systems) no maintenance on the real-time database shall be necessary once the systems is fully configured an operational

C3.4.10.4.8. Training

The supplier shall provide training that shall be directly applicable to the actual equipment and software to be provided as part of the system offered. Generalised training based upon roughly similar equipment shall not be accepted. Training shall be provided at the following levels:

- Engineering / system administrator level.

Full access to the system & database including system configuration, programming, testing & commissioning to enable the authorised engineer / administrator to add, delete and make changes to the system as required.

- Operational & maintenance level.

Training as required to enable personnel to operate the system confidently and to identify basic problems in order to perform first line maintenance on the system.

- Executive level.

A basic overview with sufficient information to provide Management with a clear understanding of the system functioning & capabilities.
The supplier shall specify the following details of all courses included within the scope of the offer:

- Course Title
- Description of course content
- Duration of course
- Maximum number of attendees
- Prerequisites for attendees
- Location of course

- The courses shall be run in a disciplined fashion to ensure that CSIR personnel who successfully complete the training courses shall be deemed to be competent.

C3.4.10.4.9. Documentation to be submitted

- The supplier shall supply all documentation including manuals and drawings related to the design, installation and commissioning of the systems and equipment supplied as part of the contract. All drawings submitted to CSIR shall be accompanied by an agreed drawing transmittal advice together with a master drawing register. The training, operating and maintenance manuals shall be cross referenced and shall be the correct manual for the equipment installed and not for similar equipment items or systems. CSIR reserves the right to approve the format and content of all documentation. The supplier shall verify the quality of the document to ensure fitness for purpose both technically and typographically.

Documentation Software

- The system documentation such as diagrams, functional specifications, training manuals, etc. shall be made available in commonly used software formats.

Documentation Synopsis

- The supplier shall provide together with his offer an overview of the documentation to be supplied. This shall describe the structure and content of the documentation to be provided together with the offer. A list of required documentation is given below in this section.

Documents

- The “as built” documents shall be updated and submitted to CSIR not later than one month after the successful completion of the site acceptance test and system hand-over. The documents shall be supplied on electronic media at that stage. The final payment certificate will not be processed until it has been submitted.

Required Documents

Document Type
System Functional & Detail Specifications
System training manuals
System test specification
Commissioning sheets and test certificates
Calibration certificates

Computer hardware manuals
All software copies and passwords
Computer operating system manuals
Computer database user manuals
System user manuals
System maintenance manual and 3-year maintenance agreements.
Communication training manual
Communication user manual
Communication configuration diagrams
Warranty and Letter of Guarantee from Supplier.
As-built Drawings

Modifications

The supplier shall provide additional and amended pages sufficient for all copies of manuals and drawing sets to ensure that all sets are complete. Amendment pages listing modifications and modification history shall be included in all documents. All changes to the system made during the warranty period shall be reflected in the documentation.

C3.4.11 HEALTH AND SAFETY REQUIREMENTS AND PROCEDURES

Construction Regulations, 2014

The Contractor shall be required to comply with the Occupational Health and Safety Act, 1993: Construction Regulations, 2014 (the regulations) as promulgated in Government Gazette No 25207 and Regulation Gazette No 57 37305 of 07 Feb 2014. Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

The proposed type of work, materials to be used and potential hazards likely to be encountered on this Contract are detailed in the Project Specifications, Schedule of Quantity and Drawings, as well as in the Employers' health and safety specifications (regulation 4(1)) of the Construction Regulations 2003.

The Contractor shall in terms of regulation 5(1) provide a comprehensive health and safety plan detailing his proposed compliance with the regulations, for approval by the Employer.

The Contractor shall at all times be responsible for full compliance with the approved plan as well as the Construction Regulations and no extension of time will be considered for delays due to non-compliance with the abovementioned plan or regulations.

Payment items are included in the Schedule of Quantities to cover the Contractor's cost for compliance with the OHS Act and the abovementioned regulations.

C3.4.11.1. PROTECTION OF THE PUBLIC

The contractor shall ensure that the public is safeguarded against death or injury from the following during the entire construction period:

- Storage of and access to any construction material.
- Storage of and access to any construction equipment.
- Access to building works.
- Access to excavations

It is a specific requirement from CSIR that the contractor has public liability insurance to cover for any incident arising from anyone or a combination of the abovementioned scenarios.

C3.4.11.2 BARRICADES AND LIGHTING

Contractors are to take note of and comply with all the provisions of the Occupational Health and Safety Act: 1993 regarding the properties required barricading and lighting in and around the construction site during the entire construction period.

C3.4.11.3 TRAFFIC CONTROL ON ROADS

The contractor shall during the entire construction period where construction and/or delivery vehicles are present in the works ensure that traffic control is enforced by competent personnel with one or a combination of reflective vests, flags, strobe lights or temporary traffic signs

C3.4.11.4 MEASURES AGAINST DISEASE AND EPIDEMICS

The contractor must give special attention to enforce good hygienic conditions with regards to toilet facilities.

C3.4.11.5 AIDS AWARENESS

The contractor shall ensure that aids counselling is available to the workers who need it.

HEALTH AND SAFETY

This Health and Safety Specification is provided in terms of the requirements of the Occupational Health and Safety Act, Act No. 85 of 1993 – Construction Regulations. The *Contractor* shall comply with this act and also the *Occupational Health and Safety Manual for Construction Sites - BIFSA*.

The Contractor must also have a full-time accredited safety officer in his employment to supervise safety during working activities. In addition, the following items must take place:

- The requirements of the Occupational Health and safety Act 85 of 1993 (and all regulations made there under) and the Construction regulations of 2003, is to be explained to all contractors during the site hand-over meeting to the appointed contractor.
- Minutes of this meeting is to be filed in the project safety file.
- The successful contractor must submit a Health and Safety plan that must be approved and signed by the Health and safety agent of LD.
- The Contractor shall submit with his tender proof of adherence to the Compensation for Occupational Injury and Diseases Act.
- The contractor shall have a Project Health and Safety Specification file on site at all times. This file shall contain the following minimum requirements:
    - A list of all employees' names on site, with their specific duties. Workers such as crane operators, steel erectors, material handlers etc. shall be appointed internally in writing for their specific duties.
    - Legal documents such as the OHS act
    - Construction Regulation Requirements
    - Practical Health and Safety plan from the contractor
    - Minutes of Safety meetings
    - Risk Assessments (Daily Risk Assessment that has to be signed

- List of observed / identified risks in general
- Appointments of the Supervisor and Safety Representative

- Safety meetings shall be held at least once a month.
- The Contractor acknowledges that he is fully aware of the requirements of all of the above and undertakes to employ people who have been duly authorized in terms thereof and who have received sufficient safety training to ensure that they can comply therewith.
- The Contractor undertakes not to do, or not to allow anything to be done which will contravene any of the provisions of the Act, Regulations or Safety and Operating Procedures
- The Contractor shall ensure that a team member of the Contractor is authorized as a Responsible Person in terms of the ORHVS. This includes the completion of all the pre-authorization training required for ORHVS Responsible Person (at the Contractor's expense). The Responsible Person shall supervise the works at all times and be available to take permits where necessary.
- CSIR may, at any stage during the currency of this agreement, be entitled to:
  - Perform safety audits at the Contractor's premises, its workplaces and on its employees;
  - Refuse any employee, sub-contractor or agent of the Contractor access to its premises if such person has been found to commit any unlawful act or any unsafe working practice or is found to be not authorized or qualified in terms of the Act
  - Issue the Contractor with a work stop order or a compliance order should they become aware of any unsafe working procedures or conditions or any non-compliance with the Act, Regulations and Procedures referred to above by the Contractor or any of its employees, sub-contractors or agents.
  - No extension of time will be allowed as a result of any action taken by CSIR in terms of the above and the Contractor shall have no claim against CSIR as a result thereof.
- An authorized CSIR representative will be on site for regular site visits to monitor the Contractor's implementation of health, safety and quality Standards.
- The Contractor shall be responsible for all expenses incurred to ensure adherence to Health and Safety Regulations as stipulated above which includes but is not restricted to

ORHVS training courses, etc.

- The Contractor shall use a Fall Arrest System (FAS) as defined in the Construction Regulations whenever a risk of falling exists.

- The Contractor shall be responsible for ensuring that all equipment supplied and used and all work carried out under this contract shall be in accordance with the Occupational Health and Safety Act (Act 85 of 1993) and regulations remaining in force, as may be amended from time to time.

- In addition, the Contractor shall comply with other Safety application provisions of Government, Provincial, Municipal Safety Laws, Building, Construction and Electricity Regulations.

- The Contractor shall accept full responsibility for the means, methods, sequence or procedures of construction, for safety precautions or programs, incidental to the work of the contractor.

- The Contractor is required to submit a working methodology statement with regards to the Safety Standards while working within hazardous areas such as live substations or in close proximity of energized apparatus.

- The Contractor shall indemnify the employer and the Engineer against responsibility for safety on the site of the works.

- The Contractor shall enter into an agreement to complete the work required for the construction of the works in accordance with the provisions of all pertinent legislation and in particular with the provisions of the Occupational Health and Safety Act (Act 85 of 1993) and the regulations promulgated there under.

- Reference of the Safety Methodology Statement can be found in the Government Occupational Health and Safety Act (Act 85 of 1993) and Construction Regulations Document, which is available publicly

The safety of the Contractors personnel and employees acquire precedence over the construction works.

C3.5 MANAGEMENT OF THE WORKS

C3.5.1. Management of the Works

C3.5.1.1. Ambient/Environment Conditions:

- Altitude: +-1339m Above sea level.
- Ambient temperature: -5ºC to +36ºC (Summer daily max average +30ºC).
- Lightning conditions: Severe, with a maximum lightning ground flash density of 15 flashes per km² per annum.
- Atmosphere: Normal climatic conditions.

C3.5.1.2. Applicable Specifications

The Standard Specifications for Civil Engineering Construction SANS 1200 published by the South African Bureau of Standards and referred to as the "Standard Specifications", including the variations and additions specified in Section C3.4.2, shall be applicable to this project.

C3.5.1.3. Concurrent Construction Contracts

The Contractor's attention is drawn to the fact that other contiguous works may be executed concurrently by independent Contractor's under separate contracts in the vicinity of the Site. The works will be conducted while the substation is live. The whole MV Board and the HV Substation will be live at any given time during execution of this project, therefore works shall be planned and conducted with the consideration that the substation will be live at all times.

The other Works which will be in progress or will come into operation on or adjacent to the Site of the Works during the progress or tenancy of this Contract are likely to include, but are not limited to the following:

a) Utility Service repairs and upgrades.

The Contractor shall ensure that neither his operations nor those of his subcontractors nor the activities of his employees shall interfere with or hinder the operations (Including power supply) of the Employer or of other Contractors and he shall indemnify the Employer against all claims arising through default of this requirement.

The Contractor shall hand over portions of the Site of the Works (whether completed or not), or completed portions of the Works, to these Contractors when required by the Employer or detailed

elsewhere in this document. The Contractor shall cause no interference with or delays in the execution of these contiguous contracts.

No discount or commission for the Contractor is allowed on these contracts, and it will be assumed that he has fully allowed in the Contract Price for the presence of these Contractors on Site. Any service rendered or assistance given by the Contractor to these Contractors, save as are provided for in the Project Specifications, shall be for their accounts only since the Employer shall in no way be responsible to the Contractor for any payments in this respect.

The Contractor shall protect all known existing services as well as all work being carried out and structures being erected on the Site by other Contractors. Any damage caused to these services or structures, or any obstructions or hindrance caused to other contractors by the Contractor, and all claims arising there from, will be the sole responsibility of the Contractor.

All repair work shall be carried out at the Contractor's expense to the entire satisfaction of the Engineer.

The same obligations shall be imposed on the Employer and on other Contractors in respect of the Works being executed under this Contract.

C3.5.1.4. Contractor's Project Management Plan

The Contractor is required to prepare and submit a project management plan for the construction. The particular contents that should be included in the Contractor's Project Management Plan are listed below:

- Project structures and agreements

The Contractor shall indicate how responsibility for the various work packages will be divided between joint venture partners (where applicable) and sub-contractors. A contract organogram shall be provided showing work apportionment and project management responsibilities. The particular division of work shall match the established capabilities and capacities of each particular partner or subcontractor.

- Plant, materials and equipment

The Contractor shall prepare a Plant and Materials procurement plan, indicating the source of key Plant and Materials designated for inclusion in the Works, and demonstrating that such Plant and Materials have a proven track record of successful maintenance support in South Africa.

The Contractor shall also prepare a plan of Contractor's Equipment, indicating the source and details of construction equipment planned for use on the Contract and based on the Contractor's particular approach.

- Staffing plan

The Contractor shall prepare a detailed staffing plan showing in an organogram all key members of the Contractor's Personnel, providing a detailed CV for each such key position. The Contractor shall also show the numbers and source of all non-key staff and indicating the particular local content offering of the Contractor.

- Method statements

The Contractor shall clearly describe the overall methodology proposed for construction of the Works and include particular method statements for each work discipline included in the Works.

- Hold Points

The contractor is to include hold points for critical activities in the project and obtain the engineers approval prior to proceeding with following works. Hold points are to be listed by the contractor and approved by the engineer prior to project commencement. In addition, the contractor is to provide quality control plan before commencing with the works.

C3.5.1.5. Construction Programme

The Contractor shall submit within the period stated in the Contract Data a suitable and realistic construction programme for the consideration of the Engineer.

The programme shall be in the form of a Gantt chart and shall include the following details:

- A work breakdown structure, identifying the major activity groups.
- For each activity group further details shall be provided with regard to the scheduled start and end dates of individual activities.
- The linkages between activities shall be clearly indicated and the logical network upon which the programme is based shall be separately submitted to the engineer if requested. Any constraints shall be classified as being time-related or resource-related.

C3.5.1.6. Site Administration

- Daily Site Diary

The daily site diary in accordance with the pro forma appended in Annexure A to section C3.5.1 shall be kept up to date by the Contractor's Site Agent and will be signed on a daily basis by the Engineer's Representative.

- Information in Respect of Plant

Information relating to plant on Site shall be recorded in the daily site diary. In addition, the Contractor shall deliver to the Engineer, on a monthly basis, a detailed summary of construction plant kept on the Site, full particulars given for each day of the month. Distinction shall be made between plant in working order and plant out-of-order. Such inventory shall be submitted by the first day of the month following the month to be reported.

- Information in Respect of Employees

Information relating to labour and management on Site shall be recorded in the daily site diary. In addition, the Contractor shall deliver to the Engineer, on a monthly basis, a detailed summary of supervisory staff, labour employed (own and local labour) by category, and sub-contractors (both local and imported) for each day of the month. Such return shall be submitted by the first day of the month following the month to be reported.

- Rainfall Records

Rainfall records for the period of construction shall be taken on Site and recorded in the daily site diary. The Contractor shall provide and install all the necessary equipment for accurately measuring the rainfall. The Contractor shall also provide, erect and maintain a security fence plus gate, padlock and keys at each measuring station, all at his own cost. The Engineer or his Representative shall take and record the daily rainfall readings. The Contractor shall be permitted to attend these readings, in the company of the Engineer's Representative. Access to the measuring gauge(s) shall at all times be under the Engineer's control.

C3.5.1.7. Site Instructions

Site instructions by the Engineer, addressed to the Contractor at his office on the Site, will be numbered consecutively and will be deemed to have been received by the Contractor's Representative unless a break in the sequence of numbers is brought to the notice of the Engineer in writing immediately.

C3.5.1.8. Site Meetings

The Contractor and his authorised representative shall attend all meetings held on the Site with the Employer and the professional team at dates and times to be determined by the Engineer. Such meetings will be held to evaluate the progress of the Contract, and to discuss matters pertaining to the Contract which any of the parties represented may wish to raise. It is not the intention to discuss day-to-day technical matters at such meetings.

C3.5.1.9. **Payment Certificates**

Monthly Progress Payment Certificates shall be submitted to the Engineer's Representative on Site not later than the 20th of each month (or on the last working day prior to this date) in order to allow for checking and reconciliation of all quantities, rates, extensions and additions in the certificate. Each progress payment certificate shall include work executed or reasonably expected to be executed up to the 30th day of the specific month. The Engineer's Representative shall have a period of five (5) calendar days to review the draft certificate in collaboration with the Contractor. All quantity calculations and certificates submitted by the Contractor for checking shall be in accordance with the Engineer's standard site administration forms and formats as referred to in C3.5.1.5.

Upon agreement by the Engineer's Representative by not later than the 25th of each month, the certificate shall be submitted by the Contractor in a neat typed form in accordance with the prescribed format, and with the correct spelling, to the Engineer by not later than the 28th of each month (or on the first working day thereafter), together with four additional copies, for certification.

Where dayworks have been instructed by the Engineer, the Contractor shall submit the returns to the Engineer for signature and approval within twenty-four (24) hours of the end of the working day on which the work was executed. Daywork returns shall be submitted on forms according to the Engineer's standard format as referred to in Section C3.5.1.5. Failure to comply with the terms of this clause ill result in non-payment for such dayworks.

The tax invoice submitted with the certificate shall be dated the 1st of the month following the period certified. All costs for the preparation and submission of progress certificates shall be borne by the Contractor.

C3.5.1.10. Drawings, Operation and Maintenance Manuals

All information in the possession of the Contractor that is required by the Engineer's Representative in order to complete the As-Built drawings and to prepare a completion report for the Employer must be submitted to the Engineer's Representative before a Certificate of Practical Completion will be issued for the Works. Similarly, the Contractor will be required to submit full details of all pipes, valves, meters and specials in a suitable loose bound format, including any special operational and maintenance procedures related thereto, for incorporation in the overall operation and maintenance manual for the Scheme prior to the issue of a Certificate of Completion for the Works.

Only figured dimensions on the Drawings may be used in the interpretation thereof, and the Drawings shall not be scaled unless the Contractor is so instructed by the Engineer in writing. The Contractor shall notify the Engineer in writing of any lack of information or conflict in the information on the Drawings. The Engineer will upon written request provide any dimensions that may have been omitted from the Drawings.

C3.5.1.11. Environmental Management Plan

According to the NEMA regulations, the contractor should comply with the Environmental Authorisation (RoD), the Environmental Management Programme (EMPr) as well as Best Practices. The Contractor shall comply with all the conditions of the Environmental Agents (MDA) requirements as the EMPr is still in process. The contractor is to adhere to environmental control officers requirements.

C3.5.2. Electrical Conditions:

- The supply substation is City of Tshwane Scientia 132kV Switch station.
- The CSIR Main Substation supply will be three phase: 132/11kV, 50Hz.
- Three phase fault level at Scientia is 19.14 kA.
- Single phase fault level at Scientia is 18.92 kA.
- The phase rotation is Standard: RWB – Anti-Clockwise. However, the contractor is to confirm this on site by using a phase rotation tester.

C3.5.3. Building and Terrain Work

CSIR will provide the contractor with an access certificate to formally access to the site and works implementation.

The contractor shall ensure that he is familiar with site conditions as well as subsurface conditions prior to tendering and to include this in his pricing.

The contractor shall allow for office accommodation for meetings held on site.

The contractor shall allow for fixed-charge items such as: (SANS 1200A - 8.3):

Contractual requirements:

- Establishment of facilities on site e.g. plant, sheds, water, electricity, lighting etc.
- De-establishment of facilities from site after completion of work.
- Any other unspecified fixed-charge items.
- The supplier shall allow for time related items such as: (SANS 1200A - 8.4)
- Operation & maintenance of facilities on site.
- Supervision.
- Company and head office overhead costs.
- Other unspecified time related items.

The contractor is required to supply all material, labour, plant, equipment, loose tools, consumables, security and transport for the duration and completion of the project.

The contractor is required to clear and cart away any rubble and surplus works to a licensed landfill site.
The contractor shall make provision for the supply, transport and off-load their own facilities such as storage sheds, water and electricity supply, lighting, etc. on the site.

All civil work shall be in accordance with the relevant SANS 1200 document

All labour and transport cost shall be included in quoted rate.

Mitigating measures for the risk of collapse of excavations as per the design, as prescribed in the construction regulations and keeping excavations free of water shall be included for in the quoted rate.

Ground to be compacted to 95% MOD AASHTO at OMC in layers not exceeding 150mm.

All material used for the foundations shall be in accordance to the relevant detailed foundation drawings and SABS documents mentioned on these drawings.

All poured concrete shall be vibrated to get rid of trapped air.

C3.5.3.1. Switchgear buildings

The contractor shall supply all the material and equipment to upgrade the existing switchgear building as indicated on all the design drawings. The building upgrade will be constructed strictly according to the latest edition of the NHBRC Standards and specifications as well City of Tshwane's Building Division by-laws. The contractor is encouraged to refer to the existing structure and take cognisance of the Single line diagram and building layouts provided when carrying out the works and pre planning coupled with costing. The building approval is to include the attached structure to the switch house. Refer to Architect drawing no. P2501_ARCH_300_01 for layout for switch room and attached building dimensions. Roofing or other works may be required to achieve building control approval on the entire building with its attachment.

All material shall be new, of the best quality and shall bear the SANS stamp of approval where applicable.

All earthworks, foundations and storm water management must be designed, inspected and signed off by the appointed civil engineer.

The walls are to be constructed up to floor level, filled and compacted and signed off by the appointed civil engineer before the remainder of the work can commence.

Roofing guarantee and certificate must be submitted on the existing roofing.

All exposed wood must be treated with wood primer and two coats of mat enamel.

Vertical DPC to be installed along trench walls and as indicated.

Install "Nutec" fibre cement ceilings with Bischoff strips on joints and paint with a primer coat and two coats of white acrylic PVA.

All internal walls must be plastered and treated with a plaster primer/pacifier/bonding agent and waterproofing before it is painted. Painting requirements as indicated on the drawing.

Build a 1.2m deep cable trench in the new building, plaster and paint white where applicable.

Supply and install checker plate trench covers including all support systems.

Special attention must be given to the switch room floor as far as the tolerances and hardening compound additives are concerned.

The switch room floor must be cleaned and treated with a self-levelling grey/green (To be approved by engineer) epoxy compound after installation of switchgear has been completed.

Supply and install a stainless-steel plate in front of switchgear panel to protect floor.

Missing surveyor's pegs must be replaced by a professional land surveyor.

C3.5.3.2. Fire Monitoring and CCTV

All additional fire monitoring sensors to be installed and linked to existing fire monitoring system in accordance with the existing specifications

All additional CCTV Camera's or where relocation of CCTV Cameras is required shall be linked to the existing Camera monitoring system in accordance with the existing specifications

C3.5.3.3. Lighting and small power

General emergency lights will be required in all building rooms as indicated on drawings. Emergency lights to be integrated into several lights fittings to provide backup lighting as per design. It should be noted that they are NOT to be taken from the 110V DC system.

The illumination levels should be as stated bellow:

Reference standard	**OHS ACT – Environmental Regulations for Workplaces**
Average illumination level (all interior substation rooms)	100 lux
High Voltage yard	10 lux

Substation Entrances, Ramps, stairs & Corners	20 lux
Control Room and Battery Room Vertical control panel face Rear control panels	 200 lux 100 lux
All Interior Emergency Lighting	5 lux at floor level

All lighting levels will comply with the minimum requirements as set out in The South African Occupational Health and Safety Act of 1993.

Install normal lights and small power. Light fittings in switch room shall be installed against the wall 500mm below the ceiling. All conduits must be surface mounted.

Install emergency DC lighting complete with timer and control gear. The emergency fittings for the switchgear room and trenches must be switched separately. Light fittings in switch room shall be installed against the wall 500mm below the ceiling. Light fittings in trench shall be installed against the trench wall between the fixed trench cover and the cable rack.

The light fittings installed in the trench shall be totally enclosed splash proof fittings, manufactured from non-metallic material with a poly-carbonate diffuser. It shall have an IP54 ingress protection rating.

Conductor sizes shall be as follows: lights - 1.5mm²
plugs - 2.5mm²

The AC & DC systems are not to share the same conduits and switches.
The conduits and switches of the AC & DC systems must be clearly distinguishable from one another.

C3.5.3.4. Construction access

Supply and install one high security 2.5m swing gate.

C3.5.3.5. Equipment and material

All equipment and material required to complete all the work under this specification must be included for in the scope of the successful supplier.

C3.5.3.6. Site security

Provide security day/night for contractor's equipment where stored outside. CSIR will not be held responsible for missing equipment.

C3.5.3.7. Storage

All equipment and building material must be delivered directly to site and stored in such a manner so that access to other services and surrounding properties are not affected, it does not pose danger to anybody or cause damage to any third party. The safety of material on site is solely the responsibility of the supplier.

C3.5.3.8. Documentation

The successful supplier shall provide the following comprehensive handover documentation within one month of handover:

- A COC for the low voltage installation.
- As-built documentation of all civil work, including but not limited to as built drawings and compaction certificates.
- General Equipment Literature, Equipment Make and Model, Equipment Data Sheets
- Operation and Maintenance Instructions or manual
- OEM Test Procedure, Test Certificates, Equipment Data sheets, OEM Site Acceptance Test Procedure, SAT, FAT
- Calibration certificates, Commissioning sheets
- Acceptance test report based on functional requirements and COC's.
- Warranty, Letter of guarantee from supplier, OEM schedules with start and end dates during equipment life cycle.
- OEM Maintenance schedule and proposal for the 3-year maintenance support for all installed equipment including the details of the qualified personnel to support post project practical completion.
- Documented operating philosophy of the substation
- General Arrangement Drawing, Wiring Diagram, As-build drawings
- A roofing certificate must be provided for the new roofs.
- Fire control certificates
- Glazing certificates, OHS Sign off for the building.

The final payment certificate will not be processed until it has been submitted.

C3.5.4.1. Excavations

C3.5.4.1.1. Classification of Excavation Material

"Pickable" is defined as soil which can be easily excavated and does not contain any "rock" or "hard material", e.g. gravel, earth, turf, scale, sand, silt and clay, which may contain loose rocks with a nominal diameter of up to 300 mm.

"Rock" is defined as material that can only be excavated with the aid of pneumatic tools or mechanical ripper, including soil containing loose boulders with a nominal diameter of between 300 mm and 1000 mm.

"Hard Rock" is defined as material consisting of boulders with a nominal diameter of more than 1000 mm, including solid rock in bulk or banks or ledges, the practical excavation of which would necessitate the use of explosives and/or drilling and wedging.

The Engineer shall do classification of excavation material, but should the contractor disagree with the representative's decision, an independent third party acceptable to both the engineer and the contractor, shall be called in to do a classification. The decision of this third party shall be accepted as final.

The contractor shall acquaint him with the nature of the material to be excavated for the works prior to submitting his tender. Submission of a tender shall be deemed to be an acknowledgement that he has done so.

C3.5.4.1.2. New Cable Trenches

Cable trenches shall be excavated at distances from the stand boundaries as indicated on the trench cross section drawings 3784.00.00.GZA.07.U016.
Trenches shall be absolutely straight and excavated to a depth of 1200 mm measured from the final sidewalk level or natural ground level, in the absence of a sidewalk. The depth of the cables shall be not less than 1200 mm deep for MV cables and 1000 mm deep for LV cables. The centreline of the trench shall be 1200mm away from the stand boundary.

Where cables have to be installed across a road or street, which has yet to be built, a cable sleeve shall be installed at least 1500 mm below the final street surface, in order to ensure that the cables are not damaged during subsequent road construction activities.

The bottom of the excavated trench shall be level and has to follow the natural contour of the surrounding area.

Trenches shall be cleaned and any loose rocks and sharp edges, which may cause damage to the cables during and after installation, shall be removed prior to commencing with the installation of cables.

A trench inspection shall be conducted by the COW prior to any cables being laid.
Measurement of trenching shall be based on a linear metre measurement of the dimensions provided. However, in the event of an exceptionally large excavation being necessary due to unforeseen circumstances, the linear metre measurement will be replaced by a cubic metre measurement and shall be decided upon by the CSIR Engineer or his representative.
All backfilling for trenches shall be done in layers of approximately 250mm, each layer dampened and compacted mechanically.

All backfilling for trenches along trafficable areas (roads and property entrances) shall be done using stabilised material in layers of 250mm, each layer dampened and compacted mechanically. A soil lab test shall be furnished for excavations at road crossings to prove compliance with this requirement.

Trenches accommodating medium voltage or main low voltage, or service cables are to be initially backfilled with a layer of selected backfill covering the cables to a depth of 200mm, of which 75mm shall be below the cables. This will be done by hand so as not to damage the cables. The remaining backfill is to be done with the previously excavated material of which all the rock has been removed.

C3.5.4.1.3. Maintenance of Excavations

The contractor shall be responsible for maintaining excavations in good order, free from storm or rainwater, seepage water, mud, loose ground, rock, stone, gravel or any other strange matter that may find their way into open trenches.

The contractor shall further take all the necessary precautions to prevent any loose rock, stone or unwanted material that has been dumped alongside cable trenches, from entering open trenches.

Should large rocky or difficult areas be encountered, jackhammers or explosives may be utilised, as necessary. Due care and attention shall be given to the correct use of such methods to ensure

the minimum danger to people and surrounding property. If explosives are to be used, the Engineer shall be notified at least 3 days in advance. It is the contractors' responsibility to get permission for blasting.

All excess large stones and rocks are to be removed and transported from the site, and only dumped at a facility licensed to accept it.

C3.5.4.1.4. Storage of Excavated Material

No excavated material shall be placed on top of any surveyor's pegs or stand beacons.

Excavated material shall not be dumped closer than 300 mm from the side of any cable trenches.
All rubble from building demolition must be immediately taken of site.
The contractor must make provision for the risk of collapse.

Excavated material shall also not be placed where it may endanger human life.

All excavated material shall be dumped in such a manner that it will cause the minimum inconvenience to pedestrians and traffic. Under difficult circumstances the representative may instruct the contractor to remove some or all of the excavated material to a remote storage position.

Unusable excavated material should only be dumped at a licensed facility.

Contractors are to take note of and comply with the provisions of the Occupational Health and Safety Act: 1993 regarding excavations. Refer to the Safety Specification accompanying this document, and make proper allowance to comply with all its provisions.

Excavations, cable laying and backfilling operations shall be programmed to minimise damage and inconvenience to people due to open trenches, holes, dumped soil and stones.

The amount of trenching to be carried out on a day shall be carefully assessed taking the availability of cable and workforce into account. No cable trenches may be open for more than two consecutive days.

It is a requirement of this contract that written notice to occupants of properties where the entrance needs to be closed off for excavations for cables be given at least two working days in advance

after arranging suitable times for such closures that will cause the least inconvenience to the people affected. Any such excavation must be backfilled to a trafficable condition before 17h00 on the day that it was opened.

Furthermore, all vehicle access driveways shall be closed as soon as possible. Where necessary, temporary bridges of braced steel plates shall be placed over open trenches, where vehicles have to cross whilst the trench is open. The design of this temporary bridge is the responsibility of the contractor.

C3.5.4.1.5. Barricading of Trenches

Trenches left open or with no supervision shall be barricaded at all times in accordance with OHS Act. This includes trenches left open overnight or weekends.

It is an explicit requirement of this contract that all open trenches be barricaded with steel stakes 1,2m high placed no more than 12m apart and plastic warning mesh at all times to alert people of the danger. At night these measures shall be supplemented by placing rechargeable battery powered stroboscopic flashing red lanterns at intervals of no more than 20m at the top of the barricade stakes. These trenches shall be patrolled at night by watchmen, deploying at least one person per 100m of open trench.

The contractor's insurance on this contract shall, apart from other requirements, specifically cover the risks attached to excavations and open trenches.

The barricading shall be an appropriate physical barrier as is required by the OSH Act.

The contractor is responsible to maintain the barrier until the cable is installed and backfilled.

The contractor will be held responsible for all damages and claims against CSIR should injures or damages been incurred by the public.

C3.5.4.1.6. Cable Route Markers

Cable route markers will be made of concrete.

Cable route markers will be installed in the centre of the trench.

Cable markers are to be installed at an approximate spacing of 150m on long cable runs. On the rest of the route it will be installed at all deviations and at all MV joints. These shall be clearly marked to indicate a joint, route change or straight run. All road crossings shall also be marked with a cable marker.

Cable marking tape shall be of orange or yellow PVC material with 70mm black lettering, 450mm wide minimum 200 microns thick. Embossing referring to the presence of cables is required.

C3.5.4.1.7. Road Crossings

The trenching depth shall be as per E-030.

Cable sleeves shall be installed at all road crossings.

Unless otherwise specified, two additional sleeves shall be installed for future use at each road crossing.

All existing tarred roads shall be drilled. Where drilling cannot be done, CSIR's representative must approve of breaking of tar and trenching.

Sleeves shall be installed up to 1m beyond tarred surfaces.

Where tar roads needs to be excavated, the tar shall be broken not wider than 450mm.

Cable sleeves installed in road or service crossings shall be straight and free from damage. No crooked or deformed sleeves shall be installed.

The contractor shall obtain the services of an approved test laboratory to verify the grade of compaction at road crossings, if instructed to do so by the Engineer. The contractor shall bear the cost of any tests that prove that compaction has not been carried out according to the specification. All test certificates shall be handed to the Engineer before final acceptance of the installation.

A galvanized draw wire shall be installed in every sleeve, which is not used. The draw wire shall be at least 1 000 mm longer than the sleeve and 500 mm shall be rolled together at each end and left just inside the sleeve end. The spare sleeve ends shall be sealed by means of tight-fitting PVC ends caps.

After the installation of the sleeves, the sleeves shall be meticulously backfilled so that no air pockets are left. The trench shall thereafter be backfilled in layers of 150 mm and compacted with mechanical vibrators to 95% modified AASHTO density.

Backfilling on a road that has already been compacted must be done as per the civil engineer's specifications.

Where cable sleeves have to be installed to cross a road, which still has to be constructed, the sleeves shall be installed at least 1,2 m below the surface of the ground, in order to prevent damage to the sleeves during road construction works.

C3.5.4.1.8. Survey of cable routes

The contractor might be instructed to acquire the services of a professional land surveyor to replace missing stand pegs. The following is required:

- Be a registered professional land surveyor in terms of the Professional Land Surveyor and Technical Surveyors Act 1984
- Obtain from the CSIR or such other sources as may be available, all relevant information on the current location of roads and servitudes (including the latest data on widening of roads) required to accurately peg all the cable routes as required for this contract.
- Place a 12mm diameter steel peg 300mm long protruding 100mm above the surface with a white 20mm diameter conduit marker 500mm long over it filled with sand (for visibility to pedestrians, vehicle drivers etc) at least at 50m intervals on straight routes and at all deviations, at a standard off-set of 1,0m from the centre line of the cable route towards the road centre, which cable route shall be a standard distance from the stand boundary (to be advised upon commencement of contract works)
- Peg the boundaries of any new servitudes required for the purposes of this contract and furnish servitude diagrams to the CSIR who will arrange for the servitudes to be registered.

C3.6. TECHNICAL SCHEDULES A AND B

C3.6.1. Medium Voltage Switchgear

- *General Specification*

Indoor switchgear shall be manufactured and tested in accordance with IEC 62271 and shall have vacuum interrupting chambers.

Single busbar switchgear shall be provided with air insulated busbar chambers. The protection shall be on board as per the relevant GA. Unit rates provided must make provision for all protection and control cabling required

Steel plates shall be provided on the floor in front of each 11kV panel to protect the floor from damage when the breakers are withdrawn.

Schedule A: CSIR's specific requirements

Schedule B: Bidder's response to the requirements. Guarantees and particulars of equipment to be supplied (to be completed by bidder).

Detail provided in this schedule by the CSIR supersede any detail quoted in the specifications

- Detailed requirements

DESCRIPTION	SCHEDULE A	SCHEDULE B (Bidder to complete)
Type	MV metal-enclosed switchgear assembly housing a withdrawable vacuum circuit breaker	MV metal-enclosed switchgear assembly housing a withdrawable vacuum circuit breaker
Panel Dimensions	0.63m(W) Housing, 0.9/1.1m(H) High Instrument Panel. 1.16m(H) Breaker Compartment, 2.106m(L) base length	0.63m(W) Housing, 0.9/1.1m(H) High Instrument Panel. 1.16m(H) Breaker Compartment, 2.106m(L) base length
Ratings		
Equipment Make	Bidder to specify	
Equipment Model	Bidder to specify	
Rated Voltage of CB	11kV	
Rated Voltage of Earth Switch	12kV	
Rated Power Frequency Withstand Voltage Of CB	28kV	

DESCRIPTION	SCHEDULE A	SCHEDULE B (Bidder to complete)
Rated Power Frequency Withstand Voltage of Earth Switch	28kV	
Rated Lightning Impulse Withstand Voltage Of CB	95kV	
Rated Lightning Impulse Withstand Voltage Of Earth Switch	95kV	
Rated Frequency	50Hz	
Main Busbar Rating	1250A	
Busbar Connection Rating	1250A	
Incomer Breaker Operating Current Rating	1250A	
Outgoing Feeder Breaker operating Current Rating	800A	
Bus section breaker Operating Current Rating	1250A	
Minimum Rated Short Time Current, 3 Seconds	25kA	
Minimum Rated Peak Fault Current	63kA	
Minimum Rated Short Circuit Breaking Current Of CB	25kA	
Rated Short Circuit Making Current Of CB	63kA	
Operating Details		
Operating sequence	O-0.3s-CO-3min-CO	
Remote switching panel interface with off board protection	Yes CB open/Close/Breaker status	
Spare Auxiliary Contacts	2 N/O, 2N/C	
Mechanism	Motor charged springs	
Remote Control Pendant	SCAME	
Maximum break time	<48ms	
Closing time	<37ms	
Insulating medium	Vacuum	Vacuum
Control Details		
Tripping And Closing Voltage	110V DC	

DESCRIPTION	SCHEDULE A	SCHEDULE B (Bidder to complete)
Motor Rated Voltage	110V DC	
Degree Of Protection as per IEC 60529		
Busbar Chamber	IP4X	
Switch And Contact Chamber	IP65	
CB Cubicle	IP4X	
Arc vent ducts	Yes	
Internal arc classification	AFLR 25kA 1 sec /BFL-AR 25kA, 0.2 sec/ AFLR 31kA, 0.2 sec	
Arc protection Sensors	Yes	
Painting colour	RAL 7035	
Cable Connections		
Incomer Panel No.1	9 x 1-core 300mm² XLPE (Accommodate future 9*630mm^2)	
Incomer Panel No.2	3 x 1-core 300mm² XLPE (Accommodate future 9*630mm^2	
16 x Outgoing Feeder Panels	1 x 3-core 70mm² XLPE	
Control cabling	Rear, Bottom entry	
Internal Fault Resistance		
Busbar Chamber	25kA for 3s	
Cable Chamber	25kA for 3s	
Control Equipment On Panel		
Trip/close/Neutral switch	Yes	
Local/Remote Switch (lockable)	Yes	
Remote trip/close port	Yes	
Earth Switch Position Indicator	White	
Circuit breaker open indication	Green	

DESCRIPTION	SCHEDULE A	SCHEDULE B (Bidder to complete)
Circuit breaker closed indication	Red	
Cable Live LED's	Yes	
Feeder Protection	O/C and E/F + SEF	
Busbar Protection	ARC detection	
Panel heaters	Yes (220V AC, 50W min)	
LV compartment lighting	Yes	
Wiring requirements		
Auxiliary circuits	Black 1mm^2	
VT secondary circuits	R,W,B phase colour 1.5mm^2	
Earthing circuits	Green/yellow 2.5mm^2	
Panel Wiring	Grey 1.5mm^2 Multi-strand	
CT secondary circuits	R,W,B phase colour 2.5mm^2	
Metering Requirements		
Electricity Consumption meters on Transformer Incomers	Yes	
Quality of supply meter (Vectograph or equivalent) on board	Yes	
Digital Maximum Demand Ammeters per phase on incomers	Yes	
Customer metering	N/A	
VT Details		
Mounting Position	Incomer Panel	
Connected To	Incomer Cable	
Voltage Ratio	11/√3 kV :110/ √3 V	
Burden	100VA	
Class	0.5	

DESCRIPTION	SCHEDULE A	SCHEDULE B (Bidder to complete)
11kV Primary Bar Wound CT		
General CT Requirements		
Mounting Position	Cable Side	
Primary Conductor	Bar	
CT Electrical Details		
Core 1: Protection- Differential (only on incomer panels and bus-coupler panels)		
Nominal Ratio	1200/800/600/1	
Accuracy Class	Class X	
Kneepoint Voltage (Min)	>500V	
Internal Resistance (Max)	<12Ω	
Maximum Exciting Current At Secondary Voltage	<50mA	
Core Material	Grain Orientated Steel	
Core 3 : Metering		
Nominal Ratio	1200/800/600/1 (incomers) 800 /400/ 1 (feeders)	
Accuracy Class	0.2	
Burden	10VA	
Core 2 : Protection (O/C And E/F)		
Nominal Ratio	1200/800/600/1 (incomers) 800 /400/ 1 (feeders)	
Accuracy Class	5P10	
Burden	10VA	
Kneepoint Voltage	170V Min	
Internal Resistance (Max)	<8Ω	

C3.6.2. Power Cables

Power cables shall be manufactured and tested in accordance with *CSIR MV Cables Specification.*

Item 1: 6.35/11kV, 70mm^2 3 core – XLPE Type A, copper tape screened, PVC bedded, galvanized steel wire armored, and PVC Sheathed

Schedule A: CSIR's specific requirements and
Schedule B: Guarantees and particulars of equipment to be supplied (to be completed by bidder).

Item	Subclause NRS 013	Description		Schedule A	Schedule B (Bidder to complete)
C.1	4.1.3 (a)	Type of insulation (XLPE)		XLPE	
	4.1.3 (b)	Number of cores (Single or three)		3	
	4.1.3 (c)	Cable operating voltage	kV	6.35 / 11	
	4.1.3 (d)	Conductor material (copper or aluminium)	Cu /Al	Cu	
	4.1.3 (e)	Conductor size	m m^2	70	
	4.1.3 (f)	Symmetrical fault level (1 s)	kA	28.2	
	4.1.3 (g)	Earth fault level (1 s)	kA	11.0	
	4.1.5 (a)	Manufacturer's name		Bidder to specify	
	4.1.5 (b)	Country of origin		Bidder to specify	
	4.1.5 (c)	Minimum bending radius during pulling	m m	Bidder to specify	
	4.1.5 (d)	Minimum bending radius at termination mm		Bidder to specify	
	4.1.5 (e)	Maximum pulling tension	N	Bidder to specify	
	4.1.5 (f)	Drum diameter over lagging	m m	Bidder to specify	
	4.1.5 (g)	Overall width of drum	m m	Bidder to specify	
	4.1.5 (h)	Diameter of spindle hole	m m	Bidder to specify	
	4.1.5 (i)	Gross mass of cable and drum	kg	Bidder to specify	
	4.1.5 (j)	Mass of cable only	kg/ m	Bidder to specify	

	4.1.6	Details of any deviations from specification	Bidder to specify	
	4.2.1	Are screened or belted cables required?	Screened	
	4.2.4.1	Wire armouring required?	YES	
	4.3.1.2	Type B cable required	-------	
	4.3.4.1	Type of wire armouring required?	GSWA	
	4.3.5	Type of outer sheath required?	Black PVC – S2	
C.2	5.2	Are routine test certificates required? Yes/No	Yes	
C.3	6.1.1.1 (e)	Details of any unique sequence of alphanumeric characters required	Yes	
	6.2.2	Is a treated drum required?	No	
	6.2.3	Length of cable on drum if not 300 m for three-core m	300	
	6.2.3	or 500 m for single-core m	500	
C.4	7	Is documentation required?	Yes	

Single Core XLPE Cable - 6350/11000V, 1-Core, Type A, 300mm²

Subclause NRS 013	Schedule A – Required Specification	Schedule B – Bidder's Offer & Price
Cable Type	6350/11000V, 1-Core, Type A, 300mm²	
Voltage Rating	6.35/11 kV	Bidder must comply
Number of Cores	1 Core	Bidder must comply
Conductor Material	Copper	Bidder must comply
DC Resistance @ 20°C	0.06 ohms/km	
AC Resistance @ 90°C	0.08 ohms/km	
Symmetrical (250°C)	41.2 kA (1sec)	
Earth fault (200°C)	18.4 kA (1sec)	
Conductor Size	300mm²	Bidder must comply
Insulation Material	XLPE (Cross-Linked Polyethylene)	Bidder must comply
Sheath Material	PVC or HDPE	
Armoring	Armored	Bidder must comply
Applicable Standards	SANS 1339 / IEC 60502-2	Bidder must comply

Subclause NRS 013	Schedule A – Required Specification	Schedule B – Bidder's Offer & Price
Current Carrying Capacity	As per manufacturer's specification	Bidder must comply
Short Circuit Rating	As per manufacturer's specification	Bidder must comply
Maximum Operating Temperature	90°C	Bidder must comply
Installation Method	Direct buried / in ducts / on trays (Specify)	Bidder must comply
Trenching Depth	Minimum 1.0m below ground	Bidder must comply
Soil temperature	25 deg	Bidder must comply
Air temperature	30 deg	Bidder must comply
Bedding Material	Sand or stone dust (as per spec)	Bidder must comply
Cable Protection	Warning tape and protection slabs	Bidder must comply
Bending Radius	Minimum 12 × Cable Diameter	Bidder must comply
Earthing & Bonding	As per electrical design	Bidder must comply

Item 2: Anti-Theft Earthing Strap 35mm^2

Schedule A: CSIRs specific requirements and

Schedule B: Guarantees and particulars of equipment to be supplied (to be completed by bidder).

Description	**Schedule A**	**Schedule B** (Bidders to complete)
Number of cores	1	
Conductor material	Tinned Copper, galvanized steel and ultra tensile steel strands	
Conductor equivalent size mm^2	35	
Nominal (actual) conductor size (for lug sizes) mm^2	Bidder to specify	
Permissible short circuit current (1 s) kA	5	
Manufacturer's name	Bidder to specify	
Country of origin	Bidder to specify	
Gross mass of cable and drum Kg	Bidder to specify	

Mass of cable only	kg/m	Bidder to specify	
Details of any deviations from specification		Bidder to specify	
Type of outer sheath required?		Clear PVC	
Are routine test certificates required?		Yes	
Is a treated drum required?		No	
Length of cable on drum	M	Bidder to specify	
Is documentation required		Yes	

C3.6.3. 11kV Protection Equipment (Protection onboard with 11kV Switchboard, additional Remote switch control board is separate)

DESCRIPTION	SCHEDULE A	SCHEDULE B (Bidders to complete)
	Minimum Requirements	
ALL SCHEMES TO BE IEC 61850 COMPLIANT		
11kV Incomer Protection and bus-coupler protection Schemes		
Cable Protection Relay	SEL751 - 751401DCD3D7081AC10 or Similar	
Minimum Functionality		
Cable Differential Protection	Yes	
Trip Circuit Supervision (Dual State)	Yes	
Heavy Duty Output Relays	4	
Data Communication port to Substation LAN – Protocol	Yes	
Local Data Communication Port	Yes	
Technical Details		
Rated Current (In)	1A	
Output Contact Rated Voltage	250V AC/DC	
Rated Auxiliary Supply Voltage	110V DC	
Rated Auxiliary Supply Voltage Operation Range	80% - 120%	
Bay Module Relay		
Minimum Functionality		
Graphical Man-Machine Interface	Option	
Programmable Energizing Inputs	Yes	

DESCRIPTION	SCHEDULE A	SCHEDULE B (Bidders to complete)
	Minimum Requirements	
2 Stage 3 Phase directional Over-current Protection	Yes	
2 Stage directional Earth Fault Protection	Yes	
Sensitive directional Earth Fault Protection	Yes	
Cable Thermal Protection	Yes	
Multi shot Auto Re-close	Yes	
Synchronizing Check and Energisation Check	Yes	
Circuit Breaker Fail Protection	Yes	
Trip Circuit Supervision (Dual State)	Yes	
Close Circuit Supervision	Yes	
Close Spring Charge Supervision	Yes	
Voltage and Current Measuring Functions	Yes	
3 Phase Power Measuring Functions (kWhr + kVARhr + MD)	Yes	
Disturbance Recorder	Yes	
Event Recorder	Yes	
Internal hardware and Software Supervision	Yes	
Minimum Programmable Heavy Duty Output Relays	5	
Minimum Programmable Signal Output Relays	10	
Minimum Number of Binary Inputs	30	
Minimum Number of Indication LED's	8	
Full Local and Remote Control and Interlocking	Yes	
Data Communication port to Substation LAN - Protocol	Yes	
Local Data Communication port	Yes (front)	
Technical Details		
Number of Voltage Inputs	3	
Rated Voltage (Un)	100V / 110V	
Rated Voltage Withstand: Continuously	2 x Un	
Number of Current Inputs	4	
Rated Frequency (fn)	50Hz	
Rated Current (In)	1A	
Rated Current of Fifth Element (In)	N/A	
Thermal Current Withstand: Continuous	4 x In	
Thermal Current Withstand: Continuous for In = 0.2A	7.5 x In	
Thermal Current Withstand: 1s	100 x In	
Input Impedance: (In = 1A)	< 100mW	

DESCRIPTION	SCHEDULE A	SCHEDULE B (Bidders to complete)
	Minimum Requirements	
Output Contact Rated Voltage	250V AC/DC	
Power/ Signal Contact Thermal Withstand capability: Continuous	5A	
Power/ Signal Contact Thermal Withstand capability: 3s	15A/8A	
Power/ Signal Contact Thermal Withstand capability: 0.5s	30A/10A	
Binary Input Voltage Range	90V-130V dc	
Rated Auxiliary Supply Voltage	110V DC	
Rated Auxiliary Supply Voltage Operation Range	80% - 120%	
MAXIMUM Breaker Fail Protection Reset time	20msec	
Master Trip Relays		
Minimum Functionality		
Mechanically Latched	Yes	
Flagged Indication	Yes	
Electrical Reset	Yes	
Number of Power Normally open Contacts	5	
Number of Power Normally closed Contacts	3	
Technical Details		
Maximum Operation time	25ms	
Rated Supply Voltage	110V DC	
Rated Supply Voltage Operation Range	80% - 120%	
Output Contact Rated Voltage	250V AC/DC	
Contact Thermal Withstand capability: Continuous	10A	
Contact Thermal Withstand capability: 1s	20A	
Contact Thermal Withstand capability: 0.2s	30A	
External Trip Circuit Supervision (If not included in above)		
Minimum Functionality		
Automatic Reset Unhealthy Flag Indication	Yes	
Continuous monitoring in both Circuit Breaker States	Yes	
Number signal outputs	2	
Technical Details		
Rated Supply Voltage	110V DC	
Rated Supply Voltage Operation Range	80% - 120%	
Alarm Annunciator		
Minimum Functionality		

DESCRIPTION	SCHEDULE A	SCHEDULE B (Bidders to complete)
	Minimum Requirements	
Programmable NO / NC Alarm channel activation	Yes	
Internally generated Alarm contact voltage	Yes	
Individually programmable Alarm start delay	Yes	
Event Recorder	No	
Programmable Output relays for Group Alarms	Yes	
Audible Alarm	Option	
Internal hardware and Software Supervision	Yes	
Data Communication port to Substation LAN - Protocol	Yes	
Technical Details		
Minimum Number of Alarm Inputs	16	
Minimum Number of Signal Outputs	Specify	
Output Contact Rated Voltage	250V AC/DC	
Binary Input Voltage Range	90V-130V dc	
Rated Supply Voltage	110V DC	
Rated Supply Voltage Operation Range	80% - 120%	
11kV Outgoing Feeder Protection Scheme		
Cable Protection Relay	SEL751 - 751101DCD3D7081AC1 0 or Similar	
Minimum Functionality		
TRFR Protection (2x Generator Feeders)	MVAA21	
Fibre Optic Cable Differential Protection	No	
Trip Circuit Supervision (Dual State)	Yes	
Heavy Duty Output Relays	4	
Data Communication port to Substation LAN – Protocol	No	
Local Data Communication Port	Yes	
Technical Details		
Rated Current (In)	1A	
Output Contact Rated Voltage	250V AC/DC	
Rated Auxiliary Supply Voltage	110V DC	
Rated Auxiliary Supply Voltage Operation Range	80% - 120%	
Bay Module Relay		

DESCRIPTION	SCHEDULE A	SCHEDULE B (Bidders to complete)
	Minimum Requirements	
Minimum Functionality		
Graphical Man-Machine Interface	Option	
Programmable Energising Inputs	Yes	
3 Stage 3 Phase Over current Protection	Yes	
3 Stage Earth Fault Protection	Yes	
Directional Over current Protection	No	
Directional Earth Fault Protection	No	
Directional Sensitive Earth Fault Protection	No	
Cable Thermal Protection	No	
Under Frequency Protection	No	
Multi shot Auto Re-close	Yes	
Synchronising Check and Energisation Check	No	
Circuit Breaker Fail Protection	Yes	
Trip Circuit Supervision (Dual State)	Yes	
Close Circuit Supervision (Dual State)	Yes	
Close Spring Charge Supervision	Yes	
Voltage and Current Measuring Functions	Yes	
3 Phase Power Measuring Functions (kWhr + kVARhr + MD)	Only for directly fed customers	
Disturbance Recorder	Yes	
Event Recorder	Yes	
Internal hardware and Software Supervision	Yes	
Minimum Programmable Heavy Duty Output Relays	5	
Minimum Programmable Signal Output Relays	10	
Minimum Number of Binary Inputs	30	
Minimum Number of Indication LED's	8	
Full Local and Remote Control and Interlocking	Yes	
Data Communication port to Substation LAN - Protocol	No	
Local Data Communication port	Yes	
Technical Details		
Number of Voltage Inputs	3	
Rated Voltage (Un)	100V / 110V	
Rated Voltage Withstand: Continuously	2 x Un	
Number of Current Inputs	4	

DESCRIPTION	SCHEDULE A	SCHEDULE B (Bidders to complete)
	Minimum Requirements	
Rated Frequency (fn)	50Hz	
Rated Current (In)	1A	
Rated Current of Fourth Element (In)	0.2A/1A	
Thermal Current Withstand: Continuous	4 x In	
Thermal Current Withstand: Continuous for In = 0.2A	7.5 x In	
Thermal Current Withstand: 1s	100 x In	
Input Impedance: (In = 1A)	< 100mW	
Output Contact Rated Voltage	250V AC/DC	
Power/ Signal Contact Thermal Withstand capability: Continuous	5A	
Power/ Signal Contact Thermal Withstand capability: 3s	15A/8A	
Power/ Signal Contact Thermal Withstand capability: 0.5s	30A/10A	
Binary Input Voltage Range	90V-130V DC	
Rated Auxiliary Supply Voltage	110V DC	
Rated Auxiliary Supply Voltage Operation Range	80% - 120%	
Rated Supply Voltage	110V DC	
Rated Supply Voltage Operation Range	80% - 120%	
Full technical details included in tender	Yes	
11kV Busbar Arc Protection Integrated with SEL 751 Relay		
ARC Protection Relay (SEL 751)		
Minimum Functionality		
Arc Sensors	Yes	
Current Supervision	Yes	
Separate Cable end zone for each Incomer/ Feeder	Yes	
Number of Arc sensors per panel (min.)	3	
Number of main zones	3 per board	
Internal hardware and Software Supervision	Yes	
Heavy Duty Output Relays	2	
Programmable Signal Output Relays	2	
Data Communication port to Substation LAN - Protocol	No	
Local Data Communication Port	Yes	
Technical Details		
Rated Current (In)	1A	

DESCRIPTION	SCHEDULE A	SCHEDULE B (Bidders to complete)
	Minimum Requirements	
Thermal Current Withstand: Continuous	4 x In	
Thermal Current Withstand: 10s	25 x In	
Thermal Current Withstand: 1s	100 x In	
Input Impedance: (In = 1A)	< 100mW	
Output Contact Rated Voltage	250V AC/DC	
Power/ Signal Contact Thermal Withstand capability: Continuous	5A	
Power/ Signal Contact Thermal Withstand capability: 3s	15A/8A	
Power/ Signal Contact Thermal Withstand capability: 0.5s	30A/10A	
Rated Auxiliary Supply Voltage	110V DC	
Rated Auxiliary Supply Voltage Operation Range	80% - 120%	
Master Trip Relays (If required)		
Minimum Functionality		
Mechanically Latched	Yes	
Flagged Indication	Yes	
Electrical Reset	No	
Number of Power Normally open Contacts	5	
Number of Power Normally closed Contacts	3	
Technical Details		
Maximum Operation time	25ms	
Rated Supply Voltage	110V DC	
Rated Supply Voltage Operation Range	80% - 120%	
Output Contact Rated Voltage	250V AC/DC	
Contact Thermal Withstand capability: Continuous	10A	
Contact Thermal Withstand capability: 1s	20A	
Contact Thermal Withstand capability: 0.2s	30A	
11kV Bus Section Protection Scheme		
Bay Module Relay	SEL751 - 751101DCD3D7081AC10 and SEL 2730M - 2730M0APAX1111AAAAX0	
Minimum Functionality		

DESCRIPTION	SCHEDULE A	SCHEDULE B (Bidders to complete)
	Minimum Requirements	
Graphical Man-Machine Interface	Option	
Ethernet Switch	Yes	
Programmable Energising Inputs	Yes	
3 Stage 3 Phase Over current Protection	Yes	
3 Stage Earth Fault Protection	Yes	
Directional Over current Protection	Yes	
Directional Earth Fault Protection	Yes	
Fuse Fail Supervision	Yes	
Synchronising Check and Energisation Check (DB/DL included)	Yes	
Circuit Breaker Fail Protection	Yes	
Main Trip Circuit Supervision (Dual State)	Yes	
Backup Trip Circuit Supervision (Dual State)	Yes	
Close Circuit Supervision (Dual State)	Option	
Close Spring Charge Supervision	Yes	
Voltage and Current Measuring Functions	Yes	
3 Phase Power Measuring Functions	No	
Circuit Breaker Wear Monitor	Yes	
Disturbance Recorder	Yes	
Event Recorder	Yes	
Internal hardware and Software Supervision	Yes	
Minimum Programmable Heavy Duty Tripping Output Relays	6	
Minimum Programmable Signal Output Relays	10	
Minimum Number of Binary Inputs	30	
Minimum Number of Indication LED's	8	
Full Local and Remote Control and Interlocking	Yes	
Data Communication port to Substation LAN - Protocol	No	
Local Data Communication port	Yes (front)	
Technical Details		
Number of Voltage Inputs	3	
Rated Voltage (Un)	110V	
Rated Voltage Withstand: Continuously	2 x Un	
Number of Current Inputs	4	
Rated Frequency (fn)	50Hz	

DESCRIPTION	SCHEDULE A	SCHEDULE B (Bidders to complete)
	Minimum Requirements	
Rated Current (In)	1A	
Rated Current of Fourth Element (In)	0.2 / 1A	
Thermal Current Withstand: Continuous	4 x In	
Thermal Current Withstand: Continuous for In = 0.2A	7.5 x In	
Thermal Current Withstand: 1s	100 x In	
Input Impedance: (In = 1A)	< 100mW	
Output Contact Rated Voltage	250V AC/DC	
Power/ Signal Contact Thermal Withstand capability: Continuous	5A	
Power/ Signal Contact Thermal Withstand capability: 3s	15A/8A	
Power/ Signal Contact Thermal Withstand capability: 0.5s	30A/10A	
Binary Input Voltage Range	90V - 130V Dc	
Rated Auxiliary Supply Voltage	110V DC	
Rated Auxiliary Supply Voltage Operation Range	80% - 120%	

C3.6.4. AC and DC Panel

DESCRIPTION	SCHEDULE A	SCHEDULE B (Bidders to complete)
	Minimum Requirements	
Install new AC/DC Distribution panel with interconnection to new and existing equipment. To include settings & As Built drawings. The following AC Modules will be required for the 11kV Switchgear room AC/DC Panel:	3 x 230V Single Phase AC Distribution Modules 1 x AC Supply module equipped with 2 x single phase plugs and a 3-phase outlet The following DC Modules and related equipment will be required for the 11kV Switchgear room: 3 x 110V DC Main Distribution Module	

	Each with 10 x 32A double-pole MCBs each for the 20 Feeder Panels and PFC Unit 3 x 110V DC Spring Rewind Distribution Module 1 Each with 10 x 32A MCBs each for the 20 Feeder Panels 1 x DC Interface Module to interface between the battery charger, battery, load and standby DC supply	
Phase + earth and neutral busbars located in DB	Yes	
Protection of incoming circuits	MCB	
MCB type	Double pole	
Automatic change over circuit (AC board)	No	
Common alarm for MCB tripped	Yes	
LED for MCB tripped	Yes	
Identification labels	Trafolite	
Background	Black and red	
Letters	White	

C3.6.5. Batteries

DESCRIPTION	**SCHEDULE A**	**SCHEDULE B** (Bidders to complete)
	Minimum Requirements	
Output operating voltage	110V DC	
Positive supply voltage	+ 55 V	
Negative voltage supply	- 55 V	
Battery type	NiCad	

Battery Cell Voltage	1.1 V DC	
Battery bank rating	150Ah (protection) (85 Cells , Hoppecke FNC 154L)	
Battery Stand	Battery cabinet (NiCad) – Type 2 Standalone Cabinet with fixed. Cabinet steps. 900mm x 600mm x 1925mm (WxDxH)	
Linking set	Battery Connectors for VTX NiCad batteries	

C3.6.6. Battery Charger

Description	**Schedule A (Technical Requirements)**	**Schedule B** (Bidder's Offer)
Make	Bidders to specify	
Model	Bidders to specify	
Type	110V 30A SMR With Type E Interface - ((3 Modules 1,1kw) Non-Self-Contained Switch mode Battery Charger System With Micro Processor	
Input Voltage	220V AC ±10%	
Input Frequency	50 Hz ±2.5 Hz	
Output Voltage	110V DC ±15% (adjustable)	
Output Current	30A continuous	
Power Rating	3 x 1.1kW modules (Total: 3.3kW)	
Voltage Regulation	±1% stability under varying conditions	
Ripple Voltage	<1% with battery, <4% without battery	
Charging Method	Constant Voltage Constant Current (CVCC)	
Protection Features	Overcurrent, short-circuit, overvoltage, reverse polarity, earth fault detection	
Alarms & Indicators	Visual indicators, audible alarms, remote monitoring via RS-485 MODBUS RTU	

Operating Temperature	0°C to 50°C	
Storage Temperature	0°C to 40°C (without battery), 20°C to 30°C (with battery)	
Relative Humidity	Up to 95% non-condensing	
Altitude	Up to 3,000m without de-rating	
Mechanical Design	Modular, freestanding NEMA Type 1 steel cabinet	
Access	Front access with hinged, lockable doors	
Cable Entry	Top conduit entry with gland plate	

Identification labels	Trafolite	
Colour	RAL 7032 grey	
Auto/Manual Boost	Yes	
Boost Limit Timer Circuit	Yes	
Battery Conditioning Circuit	Yes	
Fault protection	MCB's	
Battery voltage voltmeter	Yes	
Type of voltmeter	Analogue	
Length of voltmeter scale and angle of deflection	48mm / 90°	
Charger current ammeter	Yes	
Type of ammeter	Analogue	
Length of ammeter scale and angle of deflection	48mm / 90°	

Battery charger current ammeter	Yes	
Type of ammeter	Analogue	
Length of ammeter scale and angle of deflection	48mm / 90°	
Number of outputs	2	
Protection for output circuits	MCB	
Alarm Contacts	Yes	
Supply AC fail	One contact / charger	
Charge fail	One contact / charger	
High DC voltage	One contact / charger	
Low DC voltage	One contact / charger	
DC Earth Fault	One contact / charger	
Battery fail	One contact / charger	
Common alarm for all of above	One contact / charger	
Identification labels	Trafolite	

C3.6.7. Mini Sub

Item	Subclause of NRS 004	Description	Schedule A	Schedule B (Bidders to complete)
1	4.1.1.4	Nominal MV voltage kV	11	Bidders to comply
2	4.1.1.5	Rated lightning impulse withstand voltage level (MV equipment)	List 3	Bidders to comply

3	4.1.2.8	Rated supply voltage of closing and opening devices and auxiliary and control circuits	V	415	Bidders to comply
4	4.1.3.2	Rated maximum power of the mini-sub	kVA	500	Bidders to comply
5	4.2.1.3	Service conditions			
		a) humidity	%	75	Bidders to comply
		b) ambient air pollution		Severe	Bidders to comply
6	4.2.2.1.1	Mini-sub type		type B	Bidders to comply
7	4.2.2.1.4	Mini-sub design		Modular	Bidders to comply
8	4.2.2.2.1	Base type (if not steel)		Steel	Bidders to comply
9	4.2.2.2.3	Is a base with a removable section required?		No	Bidders to comply
10	4.2.2.4.2	Are roof lifting lugs required?		Yes	Bidders to comply
11	4.3.1	Enclosure material		Mild Steel	Bidders to comply
12	4.3.2	LV ASSEMBLY, material of structural parts		Mild Steel	Bidders to comply
13	4.4.2.3	Is a lock protection facility required with transponder key?		Yes	Bidders to comply
14	4.4.2.4	Is a 10 mm allen cap screw required?		Yes	Bidders to comply
15	4.5.2	Method of sealing the cover (i.e. welded or bolted).		Welded	Bidders to comply
16	4.5.2	Flat plate (e.g. glass, clear polycarbonate) oil level indicator fitted in accordance with SANS 780.		Yes	Bidders to comply
17	4.5.3	Positioning of transformer bushings		Horizontal in a straight line	Bidders to comply
18	4.6.2	Is black epoxy tar paint required?		Yes	Bidders to comply
19	4.6.3.1	Suitable paint or coating system used to protect against corrosion		Required	Bidders to comply
20	4.6.3.2	Corrosion protection for mild steel		Required	Bidders to comply
21	4.6.3.3	Corrosion protection for 3CR12 steel		Required	Bidders to comply
22	4.6.4	Paint colour		Avocado (C12)	Bidders to comply
23	6.1.4	LV earth busbar, if required		Required	Bidders to comply

24	6.1.5	Is a separate earthing configuration required?		No	Bidders to comply
25	6.2.1	Barriers to be metallic		Yes	Bidders to comply
26	6.2.2.1	Equipment required in MV compartment		SF6-Filled RMU	Bidders to comply
27	6.2.2.4	CT ratios		Bidders to specify	_____
28	6.2.2.5	Protection CT type and class		Bidders to specify	_____
29	6.2.3.2	Type of MV cables to be terminated		PILC/XLPE	Bidders to comply
30	6.2.3.2	Number of cores of MV cables to be terminated		One-core/ three-core	Bidders to comply
31	6.2.3.2	Size of MV cable to be terminated	mm^2	Variable	Bidders to comply
32	6.2.3.2	Type of MV cable to be terminated		One-4core/ three-core	Bidders to comply
33	6.2.5.1	Are earth fault indicators required?		Yes	Bidders to comply
34	6.3.2.1	Cables from the LV bushing of the transformer to the LV busbars to be flame retardant.		Yes	Bidders to comply
35	6.3.3.2.2	State finishing method.		Bidder to specify	_____
36	6.3.3.2.5	Method of busbar colour coding		Bidder to specify	_____
37	6.3.3.2.8	Number of outgoing LV feeder bays		As per the order	Bidders to comply
38	6.3.3.3.1	Provide a separate LV earth busbar?		Required	Bidders to comply
39	6.3.3.3.5	Gland plate arrangement as indicated in NRS 004?		Required	Bidders to comply
40	6.3.3.3.10	Gland hole diameters, if not Æ 65 mm and Æ 52 mm		Required	Bidders to comply
41	6.3.3.4.3	Are MCCBs to be used?		Yes	Bidders to comply
42	6.3.3.4.4	Number and rating of each MCCB		As per the order	Bidders to comply
43	6.3.3.4.5	Are vertical fuse pillars to be used?		No	Bidders to comply

44	6.3.3.4.6	Number of fuse pillars and the fuse rating of each fuse pillar?	N/A	Bidders to comply
45	6.3.3.5.1	Provide LV ammeters for all three phases?	Yes	Bidders to comply
46	6.3.3.5.2	Provide one voltmeter with a selector switch to enable any one of the phase voltages to be read?	Yes	Bidders to comply
47	6.3.3.5.4	Provide metering for outgoing circuits?	Yes	Bidders to comply
48	6.3.3.5.5	Provide main LV switch-disconnector in the LV compartment in order to isolate the LV busbars from the transformer?	No	Bidders to comply
49	6.3.3.5.6	Provide main LV circuit-breaker in the LV compartment between the transformer and the LV busbars?	Yes	Bidders to comply
50	6.3.3.5.7	Provide a single-phase 16 A three-pin socket-outlet in accordance with SANS 60884-1?	Yes	Bidders to comply
51	6.3.3.5.8	Provide an LV compartment lampholder in accordance with SANS 61184?	Yes	Bidders to comply
52	6.3.3.5.9	Standardized street lighting panel to be provided?	Yes	Bidders to comply
53	6.3.3.5.10	Transformer unit shall be fitted with a top-oil thermoelectric temperature-sensing element?	No	Bidders to comply
54	6.3.3.5.10	The maximum allowable temperature	N/A	Bidders to comply
55	6.3.3.6.1	Auxiliary circuit wiring details	Required	Bidders to comply
56	6.4.4	Transformer vector group	Dny11	Bidders to comply
57	7.5.2	Paint thickness to be verified to SANS 2808	Yes	Bidders to comply
58	8.1.1	Method for attaching labels	Bidder to specify	_____
59	8.4.3	Primary voltage, secondary voltage and kVA rating stencilled on the front, centre.	Yes	Bidders to comply
60	8.4.4	Stock number stencilled on the side or rear of the mini-sub.	No	Bidders to comply
61	8.4.7	Colour of main circuit designation labels	Bidders to specify	_____

62	8.4.7	Method for fixing and removal of main circuit designation labels	Bidders to specify	_____
63	8.5	Any other notices, nameplates or labels required?	None	Bidders to comply
64	8.6.1	Documentation to be supplied with the tender (Certificates)	Type Test, Routine Test and SANS 1029 compliance	Bidders to comply
65	8.6.5	Any other diagrams	Drawings	Bidders to comply
66	9.1	Method used to attach and detach the supports	Bidders to specify	_____
67		Integrated oil drip tray/pan in the base of mini sub.	Yes	Bidders to comply

C3.6.8 SCADA Interface

DESCRIPTION	SCHEDULE A **Minimum Requirements**	SCHEDULE B (Bidders to complete)
SCADA solution offered	Multilin G100 Advanced Substation RTU / Gateway/Integrated/Ethernet (IEC-61850 & DNP3) or Similar	
Communication cabling and equipment required to interface IEDs to RTU/gateway	Included in offer Specify fibre / copper	N/A
Protocol between RTU/gateway and IED devices	IEC61850 & DNP3	
RTU/Gateway to IED data communication path	Direct, no protocol conversion to IEDs preferred	N/A
132/11kV breaker status indications on digital	Yes	
Hard-wired IED fail indications, wired to RTU	Yes	

DESCRIPTION	SCHEDULE A **Minimum Requirements**	SCHEDULE B (Bidders to complete)
IED SCADA function filtering capability	Configurable to only data required by SCADA	
Independent, bus-wired general alarm contacts, triggered by spontaneous breaker operation.	Yes	
Trip and close controls, to match CSIR control system	Required	
Generic Requirements		
Communication system between Integrated system / RTU and SCADA Master station	DNP 3 via GPRS	
Protocol between Integrated system and SCADA Master station	DNP3	
Provision for hard-wired status and alarm indications from auxiliary equipment: Analogue outputs – 0 to 20mA Digital inputs Controls inputs – 0 to 20mA	 16 64 16	
Housing for Integrated protection and control system /RTU SCADA components	Independent steel cabinet	
Capability to match IED protocol profiles to existing SCADA Master station	Required	
SCADA function filtering capability between Integrated system / RTU and existing Master station	Required	
Integrated system power /RTU supply scheme	DC supply	
Protocol support of quality flags and time tagging	Required	
Communication channels to Master station	GPRS to remote master RTU	
Breaker, earth switch and isolator status indications to Master station	Double bit via IED	

DESCRIPTION	SCHEDULE A	SCHEDULE B (Bidders to complete)
	Minimum Requirements	
Overall response time from control execution to receipt of device status change at Master station	5 seconds maximum.	
Time Synchronization	GPS Time sync	

General note on SCADA interface:

The SCADA requirement of this project is to provide a complete, proven turn-key SCADA solution.

Tenderers are also invited to add to this schedule as required to better describe and specify the solution offered. The contractor will be responsible for the SCADA solution from the substation level up to and including the remote 'master' RTU installation, configuration and testin

Annexure C

Technical Evaluation Matrix/Rubrics

For The Provision of 11kV Switch Room Upgrade at CSIR Scientia, Pretoria

CSIR RFP No. 3702/17/10/2025

Scoring sheet to be used to evaluate functionality: Criteria 1 - Applicant's Expertise and Resources				
Sub Criteria	**Deliverables / Proof required**	**Scoring Criteria**	**Points Allocation**	**Weight**
Construction Manager	The bidder must submit a detailed curriculum vitae of a qualified and experienced construction manager. The construction manager must have proven experience in the management of Electrical MV Substation switchgear procurement, installation, and commissioning. The Construction Manager must demonstrate experience in the management of installations in live substation environments. The construction manager must have a minimum of 5-years relevant experience	The Construction Manager has more than 10 years' experience in the management of Electrical MV Substation switchgear procurement, installation, and commissioning. The Construction Manager must demonstrate experience in the management of installations in live substation environments.	10	10
		The Construction Manager has between 8 and less than 10 years' experience in the management of Electrical MV Substation switchgear procurement, installation, and commissioning. The Construction Manager must demonstrate experience in the management of installations in live substation environments	7	
		The Construction Manager has between 5 and less than 8 years' experience in the management of Electrical MV Substation switchgear procurement, installation, and commissioning. The Construction Manager must demonstrate experience in the management of installations in live substation environments.	5	
		The Construction Manager has less than 5 years' experience in the management of Electrical MV Substation switchgear procurement, installation, and commissioning. The Construction Manager must demonstrate experience in the management of installations in live substation environments.	0	
Electrical Engineer	The bidder must submit a detailed curriculum vitae of a qualified and experienced Electrical Engineer. The Electrical Engineer must have experience in the installation, configuration and commissioning of Electrical MV Substation switchgear, protective devices, and monitoring systems. The Engineers must have a minimum of 5-years relevant experience	The Engineer has an excess of 15 years' experience in the installation, configuration and commissioning of Electrical MV Substation switchgear, protective devices, and monitoring systems.	10	20
		The Engineer has between 10 and less than 15 years' experience in the installation, configuration and commissioning of Electrical MV Substation switchgear, protective devices, and monitoring systems.	7	
		The Engineer has between 5 and less than 10 years' experience in the installation, configuration and commissioning of Electrical MV Substation switchgear, protective devices, and monitoring systems.	5	
		The Engineer has less than 5 years' experience in the installation, configuration and commissioning of Electrical MV Substation switchgear, protective devices, and monitoring systems	0	
Installation Electrician/Technician	The bidder must submit a curriculum vitae of a qualified and experienced Installation Technician/Electrician. The	The Technician or Electrician has an excess of 15 years' experience in the installation of Electrical MV Substation switchgear, panels and protective devices work experience.	10	10

	Installation Technician/Electrician must have experience in the installation of Electrical MV Substation switchgear, panels and protective devices. The Technician/Electrician must have a minimum of 5-years relevant work experience	The Technician or Electrician has between 10 and less than 15 experience in the installation of Electrical MV Substation switchgear, panels and protective devices work experience.	7	
		The Technician or Electrician has between 5 and less than 10 years' experience in the installation of Electrical MV Substation switchgear, panels and protective devices work experience.	5	
		The Technician or Electrician has less than 5 years' experience in the installation of Electrical MV Substation switchgear, panels and protective devices work experience	0	
Construction Health & Safety Officer	The bidder must submit a curriculum vitae of a qualified and experienced Construction Health & Safety Officer. The Construction Health & Safety Officer must have experience in MV substation installations and proven experience in live MV Substation work (will not be required to work on live substation). The Health & Safety Officer must have a minimum of 5-years relevant experience	The Construction Health & Safety Officer has in excess of 10 years' work experience in MV substation installations and proven experience in live MV Substation work.	10	10
		The Construction Health & Safety Officer has between 8 and less than 10 years' work experience in MV substation installations and proven experience in live MV Substation work.	7	
		The Construction Health & Safety Officer has between 5 and less 8 years' work experience in MV substation installations and proven experience in live MV Substation work.	5	
		The Construction Health & Safety Officer must have less than 5 years' work experience in MV substation installations and proven experience in live MV Substation work.	0	

Criteria 2 - Company Experience				
Sub Criteria	**Deliverables**	**Scoring Criteria**	**Points Allocation**	**Weight**
Relevant MV Switchgear Experience	The bidder must submit completion letters or completion certificates for projects successfully completed for the supply, installation, testing and commissioning of 11kV switchgear rooms or similar nature (A kV switch room upgrade). The letters/certificates must have contact details of the client's project manager / responsible person for the project. The certificates must be signed and dated. The references provided must be available for access for a site visit to be arranged by the contractor to do additional vetting by the CSIR if required.	6 or more completion letters/certificates similar projects in progress or carried out in the past 15 years	10	10
		4 - 5 completion letters/certificates similar projects in progress or carried out in the past 15 years	7	
		3 completion letters/certificates similar projects in progress or carried out in the past 15 years	5	
		Less than 3 completion letters/certificates similar project in progress or carried out in the past 15 years	0	
Criteria 3 - Technical Proposal				
Sub Criteria	**Deliverables**	**Scoring Criteria**	**Points Allocation**	**Weight**
Method statement	The bidder must submit a detailed method statement outlining the proposed approach for executing the scope of work defined in this RFP. The method statement must clearly demonstrate how the bidder intends to carry out the **installation, integration, commissioning, and testing,** of the equipment and works associated with this	The method statement is comprehensive, realistic, and demonstrates deep understanding of the scope of work and is tailored to suit the requirements of the CSIR. All critical elements are comprehensively addressed as well as all relevant technical, logistical, and safety elements are addressed. The method statement addresses: the relocation of capacitors, building extensions, MV circuit breakers, MV cable extensions and protection devices, Mini substation, BTU's, SCADA Integration, and AC/DC supply boards.	10	10

	RFP. The method statement must address all relevant technical, logistical and safety considerations relating to: **Critical elements for the method statement** Mini substation, MV cable extensions, MV circuit breakers, Protection devices, BTU, AC/DC supply boards, SCADA Integration, Relocation of capacitor banks, Migration from old to new board, building extension works.	The method statement is adequate and covers some critical elements of the scope of work. All relevant technical, logistical, and safety elements are addressed to an acceptable level. The method statement addresses: the relocation of capacitors, building extensions, MV circuit breakers, MV cable extensions and protection devices, Mini substation, and BTU's.	7	
		The method statement is adequate and covers some elements of the scope of work, however it is generic. The method statement addresses: the relocation of capacitors, building extensions, MV circuit breakers, MV cable extensions and protection devices.	5	
		- Bidder failed to submit the method statement. - The method statement is irrelevant to the scope of work. - The method statement does not demonstrate understanding of the scope of work.	0	
Safety requirements	The bidder must submit documents and a method statement for this RFP, addressing the following aspects related to health and safety during project execution: • **SHE Plan and SHE Policy Statement** A comprehensive outline demonstrating the bidder's commitment to Safety, Health, and Environmental (SHE) compliance and Policy statement. • **High-Level SHE Risk Assessment** A structured evaluation identifying potential hazards related to the scope of work defined in this RFP. The SHE risk assessment must include appropriate mitigation measures and risk control strategies. • **Work Permits and LOTO Management** A detailed approach outlining the management of work permits and the Lockout/Tagout (LOTO) process, ensuring that all equipment is properly isolated and safe prior to any work commencing. • **Safe Lifting and Disposal of Oil-Filled Circuit Breakers** A procedure specifying the safe lifting, handling, and disposal of oil-filled circuit breakers. This includes the use of appropriate equipment, trained personnel, and environmentally sound waste disposal practices.	The method statement is project-specific and addresses all relevant elements of health and safety requirements in line with the safety deliverables. This includes: • SHE Plan and SHE Policy Statement • High-Level SHE Risk Assessment • Work Permits and LOTO Management • Safe Lifting and Disposal of Oil-Filled Circuit Breakers	10	10
		The method statement is project-specific and addresses some relevant elements of health and safety requirements in line with the safety deliverables. This includes: • SHE Plan and SHE Policy Statement • High-Level SHE Risk Assessment • Work Permits and LOTO Management	7	
		The method statement is project-specific and addresses some relevant elements of health and safety requirements in line with the safety deliverables. This includes: • SHE Plan and SHE Policy Statement • High-Level SHE Risk Assessment	5	
		• Bidder failed to submit the method statement. • The SHE Plan and SHE risk assessment are generic and does not address the RFP requirements. • The SHE Plan and SHE risk assessment does not demonstrate understanding of the health and safety deliverables in line with the scope of work.	0	
Project program		A complete program achievable in 8 months from commencement is submitted, and all key aspects are addressed	10	10

	Bidder must submit a high-level Project Delivery Program relevant to this RFP. The program must address the following key aspects: - Key deliverables and phases - Logical sequencing of activities - Resource requirements - Critical milestones and timelines Must be in MS projects preferably on PDF.	A complete program achievable in 9 months from commencement is submitted, and all aspects are addressed.	7	
		A complete program achievable in 10 months from commencement is submitted, and all key aspects are addressed.	5	
		- Bidder failed to submit the project program - The program is missing some of the key aspects is submitted. - Work will take more than 11 months from commencement to completion.	0	
Total				100

Annexure D

Pricing Schedule- FIRM PRICES

For the Provision of 11kV Switch Room Upgrade at CSIR Scientia, Pretoria

CSIR RFP No. 3702/17/10/2025

Please refer to Annexure D attached (In excel format)

Example on how to calculate Minimum Contract Skills Development Goal (CSDG) fee

"Minimum Contract Skills Development Goal (CSDG)" as illustrated in table 1.1 and 1.2 below:

To prevent a tender being non-responsive, the Employer shall bring to the Contractor's attention the required CSDG percentage (%) as prescribed in the final tender summary section. The percentage (%) factor multiplied by the sub-total of the tender amount will determine the minimum CSDG that needs to be achieved on the contract.

Table 1.1: Final Tender Summary – Contract Skills Development (CSDG) Example

Item	Description	Percentage (%) Factor	Sub-Total of Tender Amount	Amounts (Rands)
16	Skills Development			
16.1	Minimum Contract Skills Development Goal (CSDG) sum = CE (0.25%) x Subtotal of the tender amount	0.25%	R60 000 000.00	R150 000.00

Calculating the CSDG from table 1.1 above:

A - CSDG

B - Percentage Factor based on the CIDB class of construction Works

C – Subtotal of the tender amount

A = B x C

Therefore, the CSDG = R60 000 000x 0,25%

= R150 000

Table 1.2: Final Tender Summary – Example CE Class of Works

Item	Description	Unit	Rate	Quantity	Amount
	P&Gs				R10 000 000.00
	Concrete				R10 000 000.00
	Mechanical				R10 000 000.00
	Electrical				R10 000 000.00
	Landscaping				R5 000 000.00
	Civils				R15 000 000.00
	Sub-Total				**R60 000 000.00**
	CSDG (0.25%)				R150 000.00

	VAT (15%)				R9 022 500.00
	Total Tender Amount				**R69 172 500.00**

GENERAL NOTE:

ONLY FIRM PRICES WILL BE ACCEPTED. NON-FIRM PRICES (INCLUDING PRICES SUBJECT TO RATES OF EXCHANGE VARIATIONS) WILL NOT BE CONSIDERED

IN CASES WHERE DIFFERENT DELIVERY POINTS INFLUENCE THE PRICING, A SEPARATE PRICING SCHEDULE MUST BE SUBMITTED FOR EACH DELIVERY POINT

THE CONTRACTOR IS TO MAKE PROVISION IN THE PRICING FOR LABOUR DURING OVERTIME WORKING IN INSTANCES WHERE OUTAGES ARE BEING AFFECTED AND WORKS NEED TO BE COMPLETED OUT OF BUSINESS HOURS TO AVOID POWER SUPPLY DISRUPTIONS TO THE OPERATIONS OF THE CSIR.

Annexure E

Proposal Form and List of Returnable Documents

For the Provision of 11kV Switch Room Upgrade at CSIR Scientia, Pretoria

CSIR RFP No. 3702/17/10/2025

I/We_____

[name of entity, company, close corporation or partnership] of [full address] _____

carrying on business trading/operating as _____

represented by _____in my capacity as _____

being duly authorised thereto by a Resolution of the Board of Directors or Members or Certificate of Partners, dated _____to enter into, sign execute and complete any documents relating to this proposal and any subsequent Agreement. The following list of persons are hereby authorised to negotiate on behalf of the abovementioned entity, should CSIR decide to enter into Post Tender Negotiations with shortlisted bidder(s).

FULL NAME(S) CAPACITY SIGNATURE

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

I/We hereby offer to supply the abovementioned Services at the prices quoted in the schedule of prices in accordance with the terms set forth in the documents listed in the accompanying schedule of RFP documents.

I/We agree to be bound by those conditions in CSIR's:

1. General RFP Terms and Conditions; and CSIR's Purchasing Terms and Conditions or Any other standard or special conditions mentioned and/or embodied in this Request for Proposal.

I/We accept that unless CSIR should otherwise decide and so inform me/us in writing of award/intent, this Proposal [and, if any, its covering letter and any subsequent exchange of correspondence], together with CSIR's acceptance thereof shall constitute a binding contract between CSIR and me/us.

I/We further agree that if, after I/we have been notified of the acceptance of my/our Proposal, I/we fail to enter into a formal contract if called upon to do so, or fail to commence the supply of Services within 4 [four] weeks thereafter, CSIR may, without prejudice to any other legal remedy which it may have, recover from me/us any expense to which it may have been put in calling for Proposals afresh and/or having to accept any less favourable Proposal.

I/We accept that any contract resulting from this offer will be for a period as determined by the CSIR.

Furthermore, I/we agree to a penalty clause/s which will allow CSIR to invoke a penalty against us for non-compliance with material terms of this RFP including the delayed delivery of the Services due to non-performance by ourselves, failure to meet Subcontracting.

I/we agree that non-compliance with any of the material terms of this RFP, including those mentioned above, will constitute a material breach of contract and provide CSIR with cause for cancellation.

ADDRESS FOR NOTICES

The law of the Republic of South Africa shall govern any contract created by the acceptance of this RFP. The domicilium citandi et executandi shall be a place in the Republic of South Africa to be specified by the Respondent hereunder, at which all legal documents may be served on the Respondent who shall agree to submit to the jurisdiction of the courts of the Republic of South Africa. Foreign Respondents shall, therefore, state hereunder the name of their authorised representative in the Republic of South Africa who has the power of attorney to sign any contract which may have to be entered into in the event of their Proposal being accepted and to act on their behalf in all matters relating to such contract.

Respondent to indicate the details of its domicilium citandi et executandi hereunder:

Name of Entity:

Facsimile: _____

Address: _____

NOTIFICATION OF AWARD OF RFP

As soon as possible after approval to award the contract(s), the successful Respondent [**the Service provider**] will be informed of the acceptance of its Proposal. Unsuccessful Respondents may be advised in writing of the name of the successful Service provider and the reason as to why their Proposals have been unsuccessful, for example, in the category of price, delivery period, quality, B-BBEE or for any other reason.

VALIDITY PERIOD

CSIR requires a validity period of 90 [Ninety calendar Days from closing date] against this RFP.

Bidders are to note that they may be requested to extend the validity period of their bid, at the same terms and conditions, if the internal evaluation process has not been finalised within the validity period. However, once the adjudication body has approved the process and award of the business to the successful bidder(s), the validity of the successful bidder(s)' bid will be deemed to remain valid until a final contract has been concluded.

NAME(S) AND ADDRESS / ADDRESSES OF DIRECTOR(S) OR MEMBER(S)

The Respondent must disclose hereunder the full name(s) and address(s) of the director(s) or members of the company or close corporation [**C.C.**] on whose behalf the RFP is submitted.

1. Registration number of company / C.C. _____
2. Registered name of company / C.C. _____
3. Full name(s) of director/member(s) Address/Addresses ID Number(s)

RETURNABLE DOCUMENTS

Returnable Documents means all the documents, Sections and Annexures, as listed in the tables below.

a) **Mandatory Returnable Documents**

Failure to provide any Mandatory Returnable Documents at the closing date and time of this bid will result in a Respondent's disqualification. Bidders are therefore urged to ensure that all these documents are returned with their Proposals.

Please confirm submission of the mandatory Returnable Documents detailed below by so indicating [**Yes** or **No**] in the table below:

MANDATORY RETURNABLE DOCUMENTS	SUBMITTED [Yes/No]
In the case of Joint Ventures, bidder must submit a copy of the **signed** Joint Venture Agreement. – all JV submissions will be evaluated as per standard JV requirements.	
Bidder must provide a valid and active CRS number for 7EP or higher. Bidder must be actively registered valid as 7EP or higher	CRS Number:
Bidder must submit a fully completed and compliant schedule A & B (Technical Compliance Schedule) as per RFP requirements	
Bidder must submit a valid Letter of Good Standing from compensation fund or any other private insurer relevant to the RFP scope of work or nature of business (Must be registered and in good standing with the compensation fund or with a licensed compensation insurer as contemplated in the COID Act, No 130 of 1993)	
Bidder must submit a Diploma or Degree in Electrical Engineering or equivalent for the Construction Manager to be assigned to the project	
Bidder must submit a B-TECH/B-ENG/BSC Electrical Engineering for the Electrical Engineer to be assigned to the project.	
Bidder must submit proof of registration with ECSA as a Pr. Eng/ Pr. Technologist for the Electrical Engineer to be assigned to the project.	
Bidder must submit proof of registration as an electrical contractor with the Department of Employment & Labour for three phase installations for the low voltage electrical installer.	
Bidder must submit relevant certification for the person responsible for day-to-day supervision and of activities in an energized substation. This can be training aligned to – SAQA unit standard 259204 for MV switchgear or ORHVS (Operating Regulations for HV/MV Systems)	
Bidder must submit proof of registration with SACPCMP as a construction health and safety office (CHSO) for the assigned OHS officer	

b) **Essential Returnable Documents**

In addition to the requirements of section (a) above, Respondents are further required to submit with their Proposals the following **essential Returnable Documents** as detailed below.

Essential Returnable Documents required for evaluation purposes:

Failure to provide any essential Returnable Documents used for purposes of scoring a bid, by the closing date and time of this bid will not result in a Respondent's disqualification. However, Bidders will receive an automatic score of zero for the applicable evaluation

criterion. Bidders are therefore urged to ensure that all these documents are returned with their Proposals.

Please confirm submission of these essential Returnable Documents by so indicating [Yes or No] in the table below:

ESSENTIAL RETURNABLE DOCUMENTS USED FOR SCORING	SUBMITTED
Bidder must submit a fully completed **Annexure D –** Pricing Schedule or Bill of Quantities	
Bidder must submi**t Annexure G**: Preference Points Award Form in Terms of the Preferential Procurement Regulations 2022 (Mandatory documents to claim preference points) • Valid copy of BBBEE certificate/ sworn affidavit ✓ In case of unincorporated trust, consortium or joint venture, they must submit their consolidated B-BBEE scorecard with their **individual B-BBEE Certificate or Sworn Affidavit**. ✓ In case of sub-contracting both parties must submit copies of their valid BBBEE certificates. NB: Non-submission or invalid submission will result in zero points. Should the individual entity's B-BBEE Certificate or Sworn Affidavit of the unincorporated trust, consortium or joint venture parties **be invalid**, the joint venture scorecard will also be invalid.	
Bidder must submit a detailed CV of a Construction Manager – as per annexure C	
Bidder must submit a detailed CV of an Electrical Engineer – as per annexure C	
Bidder must submit a detailed CV of an Installation Technician/Electrician – as per Annexure C	
Bidder must submit a detailed CV of an OHS Officer – as per Annexure C	
Bidder must submit relevant Company experience – completion certificates or completion Letters – as per annexure C.	
Bidder must submit a detailed Project Methodology as per annexure C	
Bidder must submit a detailed Project Programme as per annexure C	

Other Essential Returnable Documents:

Failure to provide other essential Returnable Documents may not result in a Respondent's disqualification. Bidder will be given seven (7) working days to provide these documents if they are not submitted upon closing date and time.
Bidders are therefore urged to ensure that all these documents are either returned with their Proposals or can be submitted at time that they are requested.

Please confirm submission of these essential Returnable Documents by indicating Yes or No in the table below

OTHER ESSENTIAL RETURNABLE DOCUMENTS	**SUBMITTED [Yes/No]**
Annexure A: Standard Bidding Document (SBD) 1 Form	
Annexure E: Proposal Form and List of Returnable documents *(This document)*	
Annexure F: Certificate of Acquaintance with RFP, Terms & Conditions & Applicable Documents	
Annexure H: Standard Bidding Document (SBD) 4 Form	
Annexure I: RFP Declaration and Breach of Law Form	
Annexure J: Mutual Non-Disclosure Agreement	
Bidder must submit Performance Guarantee issued by a (From Bank / Insurance provider confirmation of 10% bid price.	
Bidder must submit installation Technician/Electrician's CV and proof of registration with the department of labour as a **Registered Person** for 3 phase installations	
Bidder must submit Technician/Electrician's CV with cable jointing certificate and 3 years' experience in PILC and XLPE jointing experience	
Bidder must submit public liability Insurance with a minimum of R10 000 000.00 per event, the number of events being unlimited.	
In the case of subcontracting arrangements, bidder must submit a copy of the **signed** subcontracting agreement. Where the subcontracting agreement has not been finalised, the bidder must submit a signed letter of intent or preliminary agreement and signed subcontracting agreement would be submitted within seven (7) days upon request.	
Annexure M: Minimum Contract Skills Development Goal (CSDG) Forms • Baseline Training Plan (Non-returnable with proposal, plan would be requested from the recommended bidder and must be submitted within seven (7) days upon request.) • Supervisor Agreement (Non-returnable with proposal, agreement would be requested from the recommended bidder and must be submitted within seven (7) days upon request.) • Interim Compliance Training Report (Non-returnable with proposal, reported would be requested from the appointed bidder) • Final Training Report (Non-returnable with proposal, reported would be requested from the appointed bidder)	

CONTINUED VALIDITY OF RETURNABLE DOCUMENTS

The successful Respondent will be required to ensure the validity of all returnable documents, including but not limited to its Tax Clearance Certificate and valid B-BBEE Verification Certificate, for the duration of any contract emanating from this RFP. Should the Respondent be awarded the contract [**the Agreement]** and fail to present CSIR with such renewals as and when they become due, CSIR shall be entitled, in addition to any other rights and remedies that it may have in terms

of the eventual Agreement, to terminate such Agreement forthwith without any liability and without prejudice to any claims which CSIR may have for damages against the Respondent.

SIGNED at _____ on this _____ day of _____20_____

SIGNATURE OF WITNESSES AND NAME OF WITNESSES

1 _____

Name _____

3 _____

Name _____

SIGNATURE OF RESPONDENT'S AUTHORISED REPRESENTATIVE:

_____

Name: _____

Designation: _____

Annexure F

Certificate of Acquaintance with RFP, Terms & Conditions & Applicable Documents

For the Provision of 11kV Switch Room Upgrade at CSIR Scientia, Pretoria

CSIR RFP No. 3702/17/10/2025

By signing this certificate, the Respondent is deemed to acknowledge that he/she has made himself/herself thoroughly familiar with and agrees with all the conditions governing this RFP. This includes those terms and conditions contained in any printed form stated to form part hereof, including but not limited to the documents stated below. As such, CSIR will recognise no claim for relief based on an allegation that the Respondent overlooked any such condition or failed properly to take it into account for the purpose of calculating tendered prices or any other purpose:

Should the Bidder find any terms or conditions stipulated in any of the relevant documents quoted in the RFP unacceptable, it should indicate which conditions are unacceptable and offer alternatives by written submission on its company letterhead, attached to its submitted Bid. Any such submission shall be subject to review by CSIR's Legal Counsel who shall determine whether the proposed alternative(s) are acceptable or otherwise, as the case may be. A material deviation from any term or condition may result in disqualification.

Bidders accept that an obligation rests on them to clarify any uncertainties regarding any bid which they intend to respond on, before submitting the bid. The Bidder agrees that he/she will have no claim based on an allegation that any aspect of this RFP was unclear but in respect of which he/she failed to obtain clarity.

The bidder understands that his/her Bid will be disqualified if the Certificate of Acquaintance with RFP documents included in the RFP as a returnable document, is found not to be true and complete in every respect.

SIGNED at _____ on this _____ day of _____ 20_____

SIGNATURE OF WITNESSES AND NAME OF WITNESSES

1 _____

Name _____

2 _____

Name _____

SIGNATURE OF RESPONDENT'S AUTHORISED REPRESENTATIVE:

_____

Name: _____

Designation: _____

Annexure G

Preference Points Award Form in Terms of the Preferential Procurement Regulations 2022

For the Provision of 11kV Switch Room Upgrade at CSIR Scientia, Pretoria

CSIR RFP No. 3702/17/10/2025

This preference form must form part of all the invited bids. It contains general information and serves as a claim form for the preference points allocated on the basis of specific goals outlined in point 3 below.

NB: BEFORE COMPLETING THIS FORM, BIDDERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF SPECIFIC GOALS, AS PRESCRIBED IN THE PREFERENTIAL PROCUREMENT REGULATIONS, 2022

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1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to this bid:

- the 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included).
- the 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included), The lowest acceptable tender will be used to determine the applicable preference point system.

1.2 Points for this bid shall be awarded for:

(a) Price; and

(b) Preference Points based on specific goals.

1.3 The maximum points for this bid are allocated as follows:

	POINTS
PRICE	80
Preference Points	20
Total points for Price and Preference Points must not exceed	**100**

1.4 Failure on the part of a bidder to submit proof of preference points together with the bid, will be

interpreted to mean that preference points are not claimed.

1.5 The CSIR reserves the right to require of a bidder, either before a bid is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the CSIR.

2. POINTS AWARDED FOR PRICE

2.1 The 80/20 preference points systems

A maximum of 80 points is allocated for price on the following basis:

80/20

$$Ps = 80\left(1 - \frac{Pt - P\min}{P\min}\right)$$

Where

Ps = Points scored for price of bid under consideration

Pt = Price of bid under consideration

Pmin = Price of lowest acceptable bid

3. PREFERENCE POINTS AWARDED

3.1 In terms of Regulation 6 (2) and 7 (2) of the Preferential Procurement Regulations, preference points may be awarded to a bidder for the specific goal specified for the tender in accordance with the table below:

3.2 Specific goals must be determined per tender.

Specific Goals	Preference Points
Reconstruction and Development Programme (RDP) Goals[1] - the promotion of QSEs	20
Total	**20**

3.3 Total preference points per specific goal to be determined per tender.

3.3.1. Total preference points per specific goal to be awarded as follows:

[1] RDP Goals: a. The promotion of South African owned enterprises; b. The promotion of export orientated production to create jobs, c. The promotion of SMMEs; d. The creation of new jobs or the intensification of labour absorption; e. The promotion of enterprises located in a specific province for work to be done or services to be rendered in that province; f. The promotion of enterprises located in a specific region for work to be done or services to be rendered in that region; g. The promotion of enterprises located in a specific municipal area for work to be done or services to be rendered, h. The promotion of enterprises located in rural areas, i. The empowerment of the work force by standardising the level of skill and knowledge of workers; j. The development of human resources, including by assisting in tertiary and other advanced training programmes, in line with key indicators such as percentage of wage bill spent on education and training and improvement of management skills; and k. The upliftment of communities through, but not limited to, housing, transport, schools, infrastructure donations, and charity organizations.

3.3.1.1 Preferential points for RPD Goals will be awarded as follows:

RDP Goals	% of Preferential points
RDP Goals met	100%
RDP Goals not met	0%

3.4 Joint Ventures, Consortiums and Trusts

A trust, consortium or joint venture[2,] will qualify for preference points as a legal entity (Incorporated), provided that the entity submits its valid B-BBEE certificate. Only valid BBBEE certificates issued by SANAS accredited verification agency will be considered for allocation of points.

A trust, consortium or joint venture will qualify for preference points as an unincorporated entity, provided that the entity submits their consolidated B-BBEE scorecard as if they were a group structure and that such a consolidated B-BBEE scorecard is prepared for every separate bid. Only valid consolidated BBBEE certificates issued by SANAS accredited verification agency will be considered for allocation of points.

Bidders must submit concrete proof of the existence of joint ventures and/or consortium arrangements. The CSIR will accept signed agreements as acceptable proof of the existence of a joint venture and/or consortium arrangement. Furthermore, in bids where unincorporated joint venture and/or consortium/sub-contractors are involved, each party must submit a separate TCS PIN and CSD number.

The joint venture and/or consortium agreements must clearly set out the roles and responsibilities of the Lead Partner and the joint venture and/or consortium party. The agreement must also clearly identify the Lead Partner, who shall be given the power of attorney to bind the other party/parties in respect of matters pertaining to the joint venture and/or consortium arrangement.

3.5 Sub-contracting

A bidder must not be awarded preference points if it is indicated in the tender documents that such a bidder intends sub- contracting more than 25% of the value of the contract to any other enterprise that does not qualify for at least the points that such a bidder qualifies for, unless the intended sub-contractor is an EME that has the capability and ability to execute the sub-contract.

[2] Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

A bidder awarded a contract may not sub-contract more than 25% of the value of the contract to any other enterprise that does not have an equal or higher B-BBEE status level than the bidder concerned, unless the contract is sub-contracted to an EME that has the capability and ability to execute the sub-contract.

4. BID DECLARATION

Bidders who claim points in respect of specific goals **must** submit the following documents:

Mandatory documents to claim preference points	**Submitted**	
	Yes √	**No** √
Valid copy of BBBEE certificate/ sworn affidavit to claim and RDP (QSEs) preference points[3]		

DECLARATION WITH REGARD TO COMPANY/FIRM

Name of company/firm: ……..

VAT registration number: ……

Company registration number: ……..

I/we, the undersigned, who is / are duly authorised to do so on behalf of the company/firm, certify that the documents submitted to claim preference points based on the specific goals are valid, and I / we acknowledge that:

i) The information furnished is true and correct;

ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 3 of this form;

iii) In the event of a contract being awarded as a result of points claimed as shown in paragraphs 3, the contractor may be required to furnish further documentary proof to the satisfaction of the CSIR that the awarded are correct;

iv) If any document is obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the CSIR may, in addition to any other remedy it may have –

(a) disqualify the person from the bidding process;

(b) recover costs, losses or damages it has incurred or suffered as a result of that person's

[3] In case of unincorporated trust, consortium or joint venture, they must submit their consolidated B-BBEE scorecard with submitting their **individual B-BBEE Certificate or Sworn Affidavit**, and each party must submit a separate TCS PIN and CSD number.
In case of sub-contracting both parties must submit copies of their valid BBBEE certificates

conduct;

(c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;

(d) recommend that the bidder or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted by the National Treasury from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and

(e) forward the matter for criminal prosecution.

v) If the CSIR is of the view that a bidder submitted false information regarding a specific goal, it must—

(a) inform the bidder; accordingly, and

(b) give the bidder an opportunity to make representations within 14 days as to why the tender may not be disqualified or, if the tender has already been awarded to the bidder, the contract should not be terminated in whole or in part.

vi) After considering the representations referred to in sub regulation (v)(b), the CSIR may, if it concludes that such information is false—

(a) disqualify the bidder or terminate the contract in whole or in part; and

(b) if applicable, claim damages from the bidder.

WITNESSES 1. …….. 2. …….	…… SIGNATURE(S) OF BIDDERS(S) DATE: …….. ADDRESS……..…… ……..

Annexure H

Standard Bidding Document (SBD) 4

CSIR RFP No. 3702/17/10/2025

BIDDER'S DISCLOSURE

1. PURPOSE OF THE FORM

Any person (natural or juristic) may make an offer or offers in terms of this invitation to bid. In line with the principles of transparency, accountability, impartiality, and ethics as enshrined in the Constitution of the Republic of South Africa and further expressed in various pieces of legislation, it is required for the bidder to make this declaration in respect of the details required hereunder.

Where a person/s are listed in the Register for Tender Defaulters and / or the List of Restricted Suppliers, that person will automatically be disqualified from the bid process.

2. Bidder's declaration

2.1 Is the bidder, or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest[4] in the enterprise, employed by the state?

YES ☐ **/NO** ☐

2.1.1 If so, furnish particulars of the names, individual identity numbers, and, if applicable, state employee numbers of sole proprietor/ directors / trustees / shareholders / members/ partners or any person having a controlling interest in the enterprise, in table below.

Full Name	Identity Number	Name of State institution

[4] the power, by one person or a group of persons holding the majority of the equity of an enterprise, alternatively, the person/s having the deciding vote or power to influence or to direct the course and decisions of the enterprise.

2.2 Do you, or any person connected with the bidder, have a relationship with any person who is employed by the procuring institution? **YES** ☐ **/NO** ☐

2.2.1 If so, furnish particulars:

……

……

2.3 Does the bidder or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest in the enterprise have any interest in any other related enterprise whether or not they are bidding for this contract? **YES** ☐ **/NO** ☐

2.3.1 If so, furnish particulars:

……

……

3 DECLARATION

I, the undersigned, (name)……in submitting the accompanying bid, do hereby make the following statements that I certify to be true and complete in every respect:

3.1 I have read and I understand the contents of this disclosure;

3.2 I understand that the accompanying bid will be disqualified if this disclosure is found not to be true and complete in every respect;

3.3 The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium[5] will not be construed as collusive bidding.

3.4 In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications, prices, including methods, factors or formulas used to calculate prices, market allocation, the intention or decision to submit or not to submit the bid, bidding with the intention not to win the bid and conditions or delivery particulars of the products or services to which this bid invitation relates.

[5] Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

3.4 The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.

3.5 There have been no consultations, communications, agreements or arrangements made by the bidder with any official of the procuring institution in relation to this procurement process prior to and during the bidding process except to provide clarification on the bid submitted where so required by the institution; and the bidder was not involved in the drafting of the specifications or terms of reference for this bid.

3.6 I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

I CERTIFY THAT THE INFORMATION FURNISHED IN PARAGRAPHS 1, 2 and 3 ABOVE IS CORRECT.

I ACCEPT THAT THE STATE MAY REJECT THE BID OR ACT AGAINST ME IN TERMS OF PARAGRAPH 6 OF PFMA SCM INSTRUCTION 03 OF 2021/22 ON PREVENTING AND COMBATING ABUSE IN THE SUPPLY CHAIN MANAGEMENT SYSTEM SHOULD THIS DECLARATION PROVE TO BE FALSE.

…… ……
Signature Date

…… ……
Position Name of bidder

Annexure I

DECLARATION BY BIDDER AND BREACH OF LAW FORM

For the Provision of 11kV Switch Room Upgrade At CSIR Scientia, Pretoria

CSIR RFP No. 3702/17/10/2025

NAME OF ENTITY: _____

We _____ do hereby certify that:

1. CSIR has supplied and we have received appropriate responses to any/all questions [as applicable] which were submitted by ourselves for RFP Clarification purposes;
2. we have received all information we deemed necessary for the completion of this Request for Proposal [**RFP**];
3. we have been provided with sufficient access to the existing CSIR facilities/sites and any and all relevant information relevant to the Services as well as CSIR information and Employees, and has had sufficient time in which to conduct and perform a thorough due diligence of CSIR's operations and business requirements and assets used by CSIR. CSIR will therefore not consider or permit any pre- or post-contract verification or any related adjustment to pricing, service levels or any other provisions/conditions based on any incorrect assumptions made by the Respondent in arriving at his Bid Price.
4. at no stage have we received additional information relating to the subject matter of this RFP from CSIR sources, other than information formally received from the designated CSIR contact(s) as nominated in the RFP documents;
5. we are satisfied, insofar as our entity is concerned, that the processes and procedures adopted by CSIR in issuing this RFP and the requirements requested from Bidders in responding to this RFP have been conducted in a fair and transparent manner; and
6. furthermore, we declare that a family, business and/or social relationship **exists / does not exist** [delete as applicable] between an owner / member / director / partner / shareholder of our entity and an employee or board member of the CSIR Group including any person who may be involved in the evaluation and/or adjudication of this Bid.
7. In addition, we declare that an owner / member / director / partner / shareholder of our entity **is / is not** [delete as applicable] an employee or board member of the CSIR.
8. If such a relationship as indicated in paragraph 7 exists, the Respondent is to complete the following section:

FULL NAME OF OWNER/MEMBER/DIRECTOR/

PARTNER/SHAREHOLDER: ADDRESS:

_____

_____

Indicate nature of relationship with CSIR:

_____

_____

[Failure to furnish complete and accurate information in this regard may lead to the disqualification of a response and may preclude a Respondent from doing future business with CSIR]

9. We declare, to the extent that we are aware or become aware of any relationship between ourselves and CSIR [other than any existing and appropriate business relationship with CSIR] which could unfairly advantage our entity in the forthcoming adjudication process, we shall notify CSIR immediately in writing of such circumstances.
10. We accept that any dispute pertaining to this Bid will be resolved through the Ombudsman process and will be subject to the Terms of Reference of the Ombudsman. The Ombudsman process must first be exhausted before judicial review of a decision is sought.
11. We further accept that CSIR reserves the right to reverse an award of business or decision based on the recommendations of the Ombudsman without having to follow a formal court process to have such award or decision set aside.

BREACH OF LAW

12. We further hereby certify that I/we (the bidding entity and/or any of its directors, members or partners) have/have not been [delete as applicable] found guilty during the preceding 5 [five] years of a serious breach of law, including but not limited to a breach of the Competition Act, 89 of 1998, by a court of law, tribunal or other administrative body. The type of breach that the Respondent is required to disclose excludes relatively minor offences or misdemeanours, e.g. traffic offences. This includes the imposition of an administrative fine or penalty.

Where found guilty of such a serious breach, please disclose:
NATURE OF BREACH:

_____

_____

_____

_____

DATE OF BREACH: _____

Furthermore, I/we acknowledge that CSIR reserves the right to exclude any Respondent from the bidding process, should that person or entity have been found guilty of a serious breach of law, tribunal or regulatory obligation.

SIGNED at _____ on this _____ day of _____ 20___

For and on behalf of _____ duly authorised hereto	AS WITNESS:
Name:	Name:
Position:	Position:
Signature:	Signature:
Date	Registration No of Company/CC
Place	Registration Name of Company/CC

Annexure J
Mutual Non-Disclosure Agreement

CSIR RFP No. 3702/17/10/2025

MUTUAL NON-DISCLOSURE AGREEMENT

1. Preamble

The Parties as identified herein are engaged in discussions relating to their potential collaboration in the Field as likewise described therein; are by virtue thereof are required to disclose Confidential Information to one another, and have agreed to do so subject to the terms and conditions as set out in this agreement.

2. Definitions

2.1. The following words and/or phrases, when used in this agreement, shall have the following meanings:

2.1.1. "Confidential Information" shall mean all scientific, technical, business, financial, past, present or future research, development, business activities, products, services and technical knowledge or marketing information , whether inside or outside the Field, which one party (the "Disclosing Party") discloses to the other party (the "Receiving Party") in connection with the discussions, and either has been identified in writing as confidential or is of such a nature (or has been disclosed in such a way) that it should be obvious to the Receiving Party that it constitutes Confidential Information. (Without limiting the generality of the aforegoing, "Confidential Information" shall include any information that falls within the definition of 'Personal Information'

2.1.2. "Disclosing Party" shall mean the Party disclosing Confidential Information under this agreement;

2.1.3. "Disclosing Purpose" shall mean, as pertains to any particular joint opportunity(ies) in the Field, the discussions held or to be held between the Parties regarding their possible collaboration and future working relationship with regards to any such opportunity(ies);

2.1.4. "Effective Date' shall mean the date of the commencement of this agreement which would be a bid award date";

2.1.5. "Notice" shall mean a written document addressed by one Party to the other and either delivered by hand; sent per registered post or telefaxed to the addresses as indicated herein";

2.1.6. "Personal Information" means any information that falls within the definition of 'Personal Information' as defined in the Protection of Personal Information Act, No 4 of 2013 ("POPI");

2.1.7. "Receiving Party" shall mean the Party receiving Confidential Information under this agreement;
"Responsible Party" means a public or private body or any other person which, alone or in conjunction with others, determines the purpose of and means for processing personal information, as defined in POPI.

3. Obligation of Confidentiality

3.1. The Receiving Party undertakes and agrees:

3.1.1. to use the Disclosing Party's Confidential Information only to give effect to the Disclosing Purpose;

3.1.2. to hold in strict confidence and not to publish or disclose to any unauthorised third parties any of the Confidential Information of the Disclosing Party without the prior written consent of the Disclosing Party;

3.1.3. to use the same degree of care (and in any event not less than reasonable care) to safeguard the confidentiality of the Disclosing Party's Confidential Information that it uses to protect its own information of like kind;

3.1.4. to limit any disclosure of such Confidential Information only to those of its employees and professional advisors who have a specific need –to-know to access such Confidential Information and either entered into a written agreement which impose, or are otherwise bound by the same restrictions as those imposed upon it by virtue of this agreement;

3.1.5. not to disclose or reveal to any third party, whomsoever, either the fact that discussions or negotiations are taking, or have taken, place between the Parties; the content of any such discussions, or other facts relating to the Disclosing Purpose;

3.1.6. on termination of this agreement, to act with the Disclosing Party's Confidential Information in accordance with a Notice delivered to it by the Disclosing Party, and if no such Notice is delivered to the Recipient, to destroy the Disclosing Party's Confidential Information in a similar manner to which it would destroy its own Confidential Information.

4. Protection of Personal Information

4.1. The Party(ies) undertake(s) to:-

4.1.1. comply with the provisions of POPI as well as all applicable legislation as amended or substituted from time to time;

4.1.2. treat all Personal Information strictly as defined within the parameters of POPI;

4.1.3. process Personal Information only in accordance with the consent it was obtained for, for the purpose agreed, any lawful and reasonable written instructions received from the applicable Responsible Party and as permitted by law;

4.1.4. process Personal Information in compliance with the requirements of all applicable laws;

4.1.5. secure the integrity and confidentiality of any Personal Information in its possession or under its control by taking appropriate, reasonable technical and organisational measures to prevent loss, damage, unauthorised destruction, access, use, disclosure or any other unlawful processing of Personal Information;

4.1.6. not transfer any Personal Information to any third party in a foreign country unless such transfer complies with the relevant provisions of POPI regarding transborder information flows; and

4.1.7. not retain any Personal Information for longer than is necessary for achieving the purpose in terms of this Agreement or in fulfilment of any other lawful requirement.

4.2. The Party(ies) undertake(s) to ensure that all reasonable measures are taken to:

4.2.1. identify reasonably foreseeable internal and external risks to the Personal Information in its possession or under its control;

4.2.2. establish and maintain appropriate security safeguards against the identified risks;

4.2.3. regularly verify that the security safeguards are effectively implemented;

4.2.4. ensure that the security safeguards are continually updated in response to new risks or deficiencies in previously implemented safeguards;

4.2.5. provide immediate notification to the Responsible Party if a breach in information security or any other applicable security safeguard occurs; provide immediate notification to the Responsible Party where there are reasonable grounds to believe that the Personal Information has been accessed or acquired by any unauthorised person;

4.2.6. remedy any breach of a security safeguard in the shortest reasonable time and provide the

Responsible Party with the details of the breach and, if applicable, the reasonable measures implemented to address the security safeguard breach;

4.2.7. provide immediate notification to the Responsible Party where either party has, or reasonably suspects that, Personal Information has been processed outside of the purpose agreed to or consented to;

4.2.8. provide the Responsible Party, upon request, with all information of any nature whatsoever relating to the processing of the Personal Information for the purpose in terms of this Agreement and any applicable law; and

4.2.9. notify the CSIR, if lawful, of receipt of any request for access to Personal Information, in its possession and relating to the CSIR.

4.3. The CSIR reserves the right to inspect the Personal Information processing operations, as well as the technical and organisational information security measures employed by the contracting Party to ensure compliance with the provisions of clause 4.

4.4. The provisions of clause 4 shall survive the termination of this Agreement, regardless of cause, in perpetuity.

5. Exclusions

5.1. The Receiving Party recognises that this agreement is not intended to restrict use or disclosure of any portion of the Disclosing Party's Confidential Information which:

5.1.1. is as at the Effective Date, or later, made known to the public or otherwise enters the public domain through no default by the Receiving Party of its obligations under this Agreement;

5.1.2. it can show was in its possession prior to the earliest disclosure by the Disclosing Party, as evidenced by written documents in its files;

5.1.3. is rightfully received by it from a third party having no obligation of confidentiality to the Disclosing Party;

5.1.4. is independently developed by the Receiving Party by a person(s) who did not have access to the Confidential Information of the Disclosing Party;

5.1.5. is disclosed by the Receiving Party after receipt of written permission from the Disclosing Party; or

5.1.6. it is requested or required by subpoena, court order, or similar process to disclose, provided that, in such an event, it will provide the Disclosing Party with prompt written notice of such request(s) so that the latter may seek an appropriate protective order and/or waive the Receiving Party's compliance with the provisions of this agreement.

6. Ownership and Provision of Information

6.1. The Disclosing Party shall retain ownership of all its Confidential Information as disclosed hereunder.

6.2. Nothing contained in this agreement or in any disclosures made hereunder shall create or imply, or be construed as to grant to the Receiving Party any license or other rights in or to the Confidential Information and/or any intellectual property rights attached thereto, or act as a waiver of any rights that the Disclosing Party may have to prevent infringement or misappropriation of any patents, patent applications, trademarks, copyright, trade secrets, know-how or other intellectual property rights owned or controlled by the Disclosing Party as at the Effective Date.

6.3. The Disclosing Party provides the Confidential Information "as is" and accordingly no disclosure thereof by it hereunder shall constitute any representation, warranty, assurance, guarantee or inducement by such Disclosing Party with respect to infringement of patents or other rights of third parties, nor is any warranty or representation as to the accuracy, completeness, or technical or scientific quality of any of the Disclosing Party's Confidential Information provided hereunder. (For the avoidance of doubt it is stated expressly that the Disclosing Party neither makes, nor have made, any representation or warranty as to the merchantability or fitness for a particular purpose of any Confidential Information disclosed hereunder).

7. Term of Obligation

7.1. The Parties' obligations concerning non-disclosure of Confidential Information contained in the above clauses shall commence on the Effective Date and shall continue for five (5) years from the date of each disclosure, unless otherwise agreed between the parties in writing, where after such obligations shall forthwith terminate.

8. No Violation

8.1. Each party represents that its compliance with the provisions of this agreement will not violate any duty which such party may have towards any third party, including obligations concerning the provision of services to others, confidentiality of information and assignment of inventions, ideas, patents or copyright.

9. Breach

9.1. It is acknowledged that the breach of this agreement by the Receiving Party would cause the Disclosing Party irreparable injury not compensable in monetary damages alone. Accordingly, in the event of a breach, or a threat of a breach, the Disclosing Party, in addition to its other remedies, is entitled to a restraining order, preliminary injunction or similar relief so as to specifically enforce the terms of this agreement or prevent, cure or reduce the adverse effects of the breach.

10. DOMICILIUM CITANDI ET EXECUTANDI

10.1. The Parties hereto respectively choose as their *domicilium citandi et executandi* for all purposes of, and in connection with this agreement, the physical addresses and contact details stated herein.

11. Notices

11.1 Any Notice to be given hereunder shall be given in writing and may be given either personally or may be sent by post or facsimile and addressed to the relevant party at its *domicilium citandi et executandi* address as chosen herein. Any notice given by post shall be deemed to have been served on the expiry of 7 (seven) working days after same is posted by recorded delivery post or air mail. Any notice delivered personally or sent by facsimile shall be deemed to have been served at the time of delivery or sending.

12. Governing Law and Jurisdiction

12.1. This agreement will be governed and construed by the laws of the Republic of South Africa and the Parties hereby submit to the exclusive jurisdiction of the South African courts to hear any dispute arising therefrom which the Parties are unable to settle amicably.

13. General

13.1. This agreement comprises the entire agreement between the parties concerning the subject matter and supersedes all prior oral and written agreements between them.

13.2. No waiver, alteration or cancellation of any of the provisions of the Agreement shall be binding unless made in writing and signed by the party to be bound.

13.3. The parties hereby warrant that the officials signing this agreement have the power to do so on behalf of the parties.

13.4. No public announcement, such as a media release, or disclosure beyond those disclosures authorised for Confidential Information hereunder may be made by either party concerning this agreement without the prior written approval of the other party.

13.5. Neither party is, by virtue of this agreement, authorised to use the name, logo(s) or trademarks of the other in connection with any advertising, publicity, marketing or promotional materials or activities, or for any other purpose whatsoever, without the prior written consent of the other party. For purposes of this clause, it is also recognised that, under the provisions of section 15 (1) of the Merchandise Marks Act, Act No 17 of 1941 of the

Republic of South Africa, the use of the abbreviation of the name of the Council for Scientific and Industrial Research, "WNNR" and CSIR , is prohibited in connection with any trade, business, profession or occupation or in connection with a trade mark, mark or trade description applied to goods, other than with the consent of the CSIR.

13.6. Both Parties shall remain free to use, in the normal course of its business, its general knowledge, skills and experience incurred before, during or after the discussions envisaged hereunder. (To this end, it is also recorded that nothing in this Agreement shall be construed as constituting an exclusive arrangement between the parties and both Parties shall remain free to explore market opportunities in the Field, unless otherwise agreed to in writing in a subsequent agreement.)

14. Parties to the NDA

THE CSIR, a statutory council, duly established under Act 46 of 1988,

and

The Bidder (Name)……

Company registration number:…… ……, with limited liability duly incorporated under the applicable laws of the Republic of South Africa herein represented by …… …… …… in his/her capacity as …… …… …… …… and he/she being duly authorised thereto.

15. Contact Details for Purposes of Clause 10:

15.1. The CSIR

Physical Address:	Postal Address:
Meiring Naude Road	PO BOX 395
Brummeria	Pretoria
0002	0001

Email: Tender@csir.co.za

The Bidder (Name)…… …… ……

Physical Address: …… …… ……

Postal Address: …… …… ……

Email: …… …… ……

16. Signature (Bidder): ……

SIGNED ON THIS THE……DAY OF……AT……

IN THE PRESENCE OF THE FOLLOWING WITNESSES:

1. ……

2. ……

ANNEXURE K

GCC Contract

CSIR RFP No. 3702/17/10/2025

For The Provision of 11kV Switch Room upgrade at CSIR Scientia, Pretoria

CSIR RFP No. 3702/17/10/2025

SERVICE LEVEL INDICATORS

SERVICE LEVEL INDICATORS

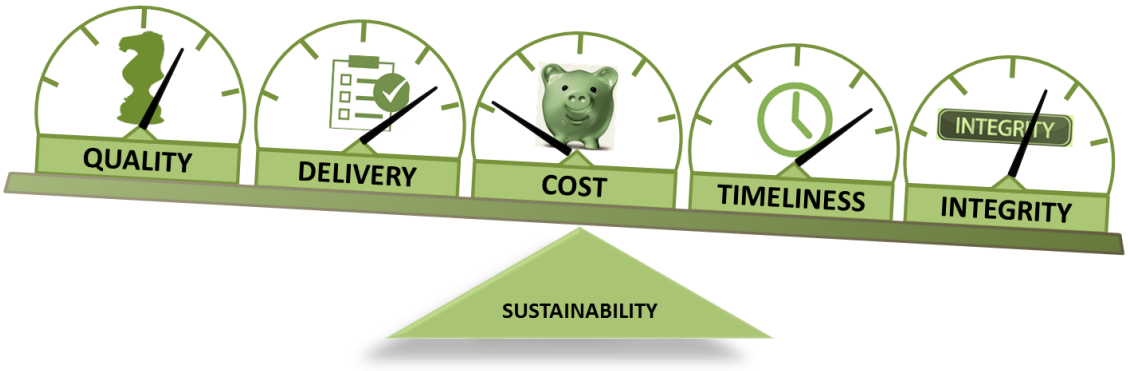
1. INTRODUCTION

The purpose of the Service Level Indicators is to guide and document the expectations and requirements of the services to be rendered to the Tendering Institutions by the Service Provider.

This document may be used as the benchmark against which reviews and, as appropriate, modifications to the service provided by the Service Provider shall take place.

2. KEY PERFORMANCE INDICATORS

Key performance indicators (KPIs) are management tools designed to monitor supplier performance and help meet the goals, objectives and service levels of the contract.



3. RANGE OF SERVICES

The Services rendered are reflected in the Scope of Work (**Annexure B**: Technical Specification).

Annexure L - Drawings

CSIR RFP No. 3702/17/10/2025

3784.00.00.GZA.07. U004	CSIR MAIN 11KV & 132KV CONTROL ROOM – NEW LAYOUT
3784.00.00.GZA.07. K003	CSIR SLD – PROPOSED NEW 11KV NETWORK OVERVIEW
P2501_ARCH_300_01	ARCHITECT FLOOR PLANT INCLUDING ATTACHED BUILDING
3784.00.02.GZA.14.U001	CSIR 11kV & 132kV CONTROL ROOM FLOOR PLAN, SECTIONS & DETAILS
3784.00.02.GZA.14.U002	CSIR 11kV & 132kV CONTROL ROOM CABLE TRENCH CLOSURE PLAN LAYOUT, SECTIONS & DETAILS