NEC3 Professional Services Contract (PSC3)

Contract between **Eskom Holdings SOC Ltd**
(Reg No. 2002/015527/30)

and **……**
(Reg No. ……/……/….)

for **NETWORK ENGINEERING AND DESIGN**
PROFFESIONAL CAPE COASTAL CLUSTER

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CONTRACT No. **46000……**

PART C1: AGREEMENTS & CONTRACT DATA

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C1.1 Form of Offer & Acceptance

Offer

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract for the procurement of:

NETWORK ENGINEERING AND DESIGN PROFFESIONAL CAPE COASTAL CLUSTER

The tenderer, identified in the Offer signature block, has

either	examined the documents listed in the Tender Data and addenda thereto as listed in the Returnable Schedules, and by submitting this Offer has accepted the Conditions of Tender.
or	examined the draft contract as listed in the Acceptance section and agreed to provide this Offer.

By the representative of the tenderer, deemed to be duly authorised, signing this part of this Form of Offer and Acceptance the tenderer offers to perform all of the obligations and liabilities of the *Consultant* under the contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the *conditions of contract* identified in the Contract Data.

The offered total of the Prices exclusive of VAT is	**Not Applicable – Cost reimbursable**
Value Added Tax @ 14% is	**Not Applicable – Cost reimbursable**
The offered total of the Prices inclusive of VAT is	**Not Applicable – Cost reimbursable**

This Offer may be accepted by the Employer by signing the Acceptance part of this Form of Offer and Acceptance and returning one copy of this document including the Schedule of Deviations (if any) to the tenderer before the end of the period of validity stated in the Tender Data, or other period as agreed, whereupon the tenderer becomes the party named as the *Consultant* in the *conditions of contract* identified in the Contract Data.

Signature(s) ....

Name(s) ....

Capacity ....

For the tenderer: ....

(Insert name and address of organisation)

Name & signature of witness

Date

.....

Acceptance

By signing this part of this Form of Offer and Acceptance, the Employer identified below accepts the tenderer's Offer. In consideration thereof, the Employer shall pay the Consultant the amount due in accordance with the *conditions of contract* identified in the Contract Data. Acceptance of the tenderer's Offer shall form an agreement between the Employer and the tenderer upon the terms and conditions contained in this agreement and in the contract that is the subject of this agreement.

The terms of the contract, are contained in:

Part C1	Agreements and Contract Data, (which includes this Form of Offer and Acceptance)
Part C2	Pricing Data
Part C3	Scope of Work: The Scope

and drawings and documents (or parts thereof), which may be incorporated by reference into the above listed Parts.

Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Returnable Schedules as well as any changes to the terms of the Offer agreed by the tenderer and the Employer during this process of offer and acceptance, are contained in the Schedule of Deviations attached to and forming part of this Form of Offer and Acceptance. No amendments to or deviations from said documents are valid unless contained in this Schedule.

The tenderer shall within two weeks of receiving a completed copy of this agreement, including the Schedule of Deviations (if any), contact the Employer's agent (whose details are given in the Contract Data) to arrange the delivery of any securities, bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the *conditions of contract* identified in the Contract Data at, or just after, the date this agreement comes into effect. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this agreement.

Notwithstanding anything contained herein, this agreement comes into effect on the date when the tenderer receives one fully completed and signed original copy of this document, including the Schedule of Deviations (if any).

Signature(s) .....

Name(s) ....

Capacity ....

for the Employer **ESKOM HOLDINGS SOC LIMITED, Megawatt Park, Maxwell Drive, Sandton, Johannesburg**

.....

Name & signature of witness ..... Date .....

Note: If a tenderer wishes to submit alternative tenders, use another copy of this Form of Offer and Acceptance.

Schedule of Deviations

Note:

1. To be completed by the Employer prior to award of contract. This part of the Offer & Acceptance would not be required if the contract has been developed by negotiation between the Parties and is not the result of a process of competitive tendering.
2. The extent of deviations from the tender documents issued by the Employer prior to the tender closing date is limited to those permitted in terms of the Conditions of Tender.
3. A tenderer's covering letter must not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid be the subject of agreement reached during the process of Offer and Acceptance, the outcome of such agreement shall be recorded here and the final draft of the contract documents shall be revised to incorporate the effect of it.

No.	Subject	Details
1		
2		
3		
4		
5		
6		
7		

By the duly authorised representatives signing this Schedule of Deviations below, the Employer and the tenderer agree to and accept this Schedule of Deviations as the only deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Tender Schedules, as well as any confirmation, clarification or changes to the terms of the Offer agreed by the tenderer and the Employer during this process of Offer and Acceptance.

It is expressly agreed that no other matter whether in writing, oral communication or implied during the period between the issue of the tender documents and the receipt by the tenderer of a completed signed copy of this Form shall have any meaning or effect in the contract between the parties arising from this Agreement.

	For the tenderer:	**For the Employer**
Signature	.....	.....
Name	.....	.....
Capacity	.....	.....
On behalf of	..... *(Insert name and address of organisation)*	..... **ESKOM HOLDINGS SOC LIMITED, Megawatt Park, Maxwell Drive, Sandton, Johannesburg**
Name & signature of witness	.....	.....
Date	.....	.....

C1.2 PSC3 Contract Data

Part one - Data provided by the *Employer*

	Statement	Data
Clause		
1	**General**	
	The *conditions of contract* are the core clauses and the clauses for main Option	
		E: **Time based contract**
	dispute resolution Option	**W1:** **Dispute resolution procedure**
	and secondary Options	
		X2 **Changes in the law**
		X7: **Delay damages**
		X9: **Transfer of rights**
		X10 ***Employer*'s *Agent***
		X11: **Termination by the *Employer***
		X18: **Limitation of liability**
		Z: ***Additional conditions of contract***
	of the NEC3 Professional Services Contract (April 2013)[1]	
10.1	The *Employer* is (Name):	**Eskom Holdings SOC Ltd (reg no: 2002/015527/30), a state owned company incorporated in terms of the company laws of the Republic of South Africa**
	Address	**Registered office at Megawatt Park, Maxwell Drive, Sandton, Johannesburg**
	Tel No.	**011 800 4585**
	Fax No.	**011 800 5803**
11.2(9)	The *services* are	**NETWORK ENGINEERING AND DESIGN PROFFESIONAL CAPE COASTAL CLUSTER**
11.2(10)	The following matters will be included in the Risk Register	**As part of the Task Instruction**
11.2(11)	The Scope is in	**Part 3: Scope of Work**
12.2	The *law of the contract* is the law of	**the Republic of South Africa**
13.1	The *language of this contract* is	**English**

[1] Available from Engineering Contract Strategies Tel 011 803 3008 Fax 011 803 3009 and www.ecs.co.za

13.3	The *period for reply* is	**5 (five) working days**
13.6	The *period for retention* is	**5 (five) years following Completion or earlier termination.**

2 The Parties' main responsibilities

25.2	The *Employer* provides access to the following persons, places and things	**access to**		***access date***
		1	**The Relevant project Sites**	**As per duration on the Task Order**
		2	**Restricted access to relevant Eskom Premises during working Hours for consultation with Employer Stakeholders**	**As per duration on the Task Order**
		3	**Restricted access to relevant Eskom Premises during working hours for use of computer equipment and software where applicable and network plant for technical evaluation and investigation and investigative purposes, where relevant and agreed to as per Task Instruction**	**As per duration on the Task Order**

3 Time

31.2	The *starting date* is.	**14 January 2023**		
11.2(3)	The *completion date* for the whole of the *services* is.	**13 January 2025**		
11.2(6)	The *key date*s and the *condition*s to be met are:	***Condition* to be met**		***key date***
		1	**Those in the Task Instruction /Order**	**Those in the Task Instruction/ Order**

4 Quality

40.2	The quality policy statement and quality plan are provided within	**2 (two) weeks of the Contract Date.**

5 Payment

50.1	The *assessment interval* is	**between the 25th day of each successive month or is as per Milestones in the Brief document attached to this contract.**
51.1	The period within which payments are made is	**As per the *Consultants* BB-BEE Status.**
51.2	The *currency of this contract* is the	**South African Rand**

51.5	The *interest rate* is	**the publicly quoted prime rate of interest charged by [●] Standard Bank of South Africa Limited at the time an amount payable in SA Rand was due,** **and** **the LIBOR rate applicable at the time for amounts due in other currencies. LIBOR is the 6 month London Interbank Offered Rate quoted under the caption "Money Rates" in The Wall Street Journal for the applicable currency or if no rate is quoted for the currency in question then the rate for United States Dollars, and if no such rate appears in The Wall Street Journal then the rate as quoted by the Reuters Monitor Money Rates Service (or such service as may replace the Reuters Monitor Money Rates Service) on the due date for the payment in question, adjusted *mutatis mutandis* every 6 months thereafter and as certified, in the event of any dispute, by any manager employed in the foreign exchange department of The Standard Bank of South Africa Limited, whose appointment it shall not be necessary to prove**

6 Compensation events

As per NEC3 PSC clause

7 Rights to material

As per NEC3 PSC clause

8 Indemnity, insurance and liability

81.1 The amounts of insurance and the periods for which the *Consultant* maintains insurance are

Event	**Cover**	**Period following Completion of the whole of the *service*s or earlier termination**
Liability for failure by the *Consultant* to use the skill and care normally used by professionals providing services similar to the *service*s	**Whatever the *Consultant* deems necessary in respect of each claim, without limit to the number of claims**	**See Notes to Consultants in Annexure A**
death of or bodily injury to a person (not an employee of the *Consultant*) or loss of or damage to property arising from or in connection with the *Consultant*'s Providing the Services.	**Whatever the *Consultant* deems necessary for any occurrence or series of occurrences arising out of one event without limit to the number of claims.**	**See Notes to Consultants in Annexure A**

	death of or bodily injury to employees of the *Consultant* arising out of and in the course of their employment in connection with this contract	**As prescribed by the Compensation for Occupational Injuries and Diseases Act No. 130 of 1993 and the *Consultant's* common law liability for people falling outside the scope of the Act with a limit of indemnity of not less than R500 000-00 (five hundred thousand) in respect of each claim, without limit to the number of claims**	**As *Consultant* deems necessary**
81.1	The *Employer* provides the following insurances	**Refer to Annexure A for details of insurance provided by the *Employer*.**	
82.1	The *Consultant*'s total liability to the *Employer* for all matters arising under or in connection with this contract, other than the excluded matters, is limited to	**The total of the Prices (task order)**	
9	**Termination**	**As per NEC3 PSC clause**	
10	**Data for main Option clause**		
E	**Time based contract**		
11	**Data for Option W1**		
W1.2(3)	The *adjudicator nominating body* is:	**the Chairman of the ICE-SA Division (or its successor body) of the South African Institution of Civil Engineering. (See www.ice-sa.org.za).**	
W1.4(2)	The *tribunal* is:	**arbitration**	
W1.4(5)	The *arbitration procedure* is	**the latest edition of Rules for the Conduct of Arbitrations published by The Association of Arbitrators (Southern Africa) or its successor body.**	
	The place where arbitration is to be held is	**East London, South Africa**	
	The person or organisation who will choose an arbitrator • if the Parties cannot agree a choice or • if the *arbitration procedure* does not state who selects an arbitrator, is	**the Chairman for the time being or his nominee of the Association of Arbitrators (Southern Africa) or its successor body.**	
12	**Data for secondary Option clauses**		
X2	**Changes in the law**		
X2.1	The law of the project is	**Any law within the Republic of South Africa which applies to the Consultant's providing the Services.**	
X7	**Delay damages**		

X7.1	Delay damages for late Completion of the whole of the *services* are	**up to 30% of the Task Instruction value**
X9	**Transfer of rights**	**As per NEC3 PSC clause**
X10	**The *Employer's Agent***	
X10.1	The *Employer's Agent* is	
	Name:	**Ralph Reddy**
	Address	**(043) 703 2294**
X11	**Termination by the *Employer***	**As per NEC3 PSC clause**
X18	**Limitation of liability**	
X18.1	The *Consultant's* liability to the *Employer* for indirect or consequential loss is limited to:	**As stated in the task order**
X18.2	The *Consultant's* liability to the *Employer* for Defects that are not found until after the *defects date* is limited to:	**The total of the Prices (task order)**
X18.3	The *end of liability date* is	**five years after Completion of the whole of the *services*/task order.**
Z	**The *Additional conditions of contract* are**	**Z1 to Z11 always apply.**

Z1 Cession delegation and assignment

Z1.1 The *Consultant* does not cede, delegate or assign any of its rights or obligations to any person without the written consent of the *Employer.*

Z1.2 Notwithstanding the above, the *Employer* may on written notice to the *Consultant* cede and delegate its rights and obligations under this contract to any of its subsidiaries or any of its present divisions or operations which may be converted into separate legal entities as a result of the restructuring of the Electricity Supply Industry.

Z2 Joint ventures

Z2.1 If the *Consultant* constitutes a joint venture, consortium or other unincorporated grouping of two or more persons or organisations then these persons or organisations are deemed to be jointly and severally liable to the *Employer* for the performance of this contract.

Z2.2 Unless already notified to the *Employer*, the persons or organisations notify the *Employer* within two weeks of the Contract Date of the key person who has the authority to bind the *Consultant* on their behalf.

Z2.3 The *Consultant* does not alter the composition of the joint venture, consortium or other unincorporated grouping of two or more persons without the consent of the *Employer* having been given to the *Consultant* in writing.

Z3 Change of Broad Based Black Economic Empowerment (B-BBEE) status

Z3.1 Where a change in the *Consultant's* legal status, ownership or any other change to his business composition or business dealings results in a change to the *Consultant's* B-BBEE status, the *Consultant* notifies the *Employer* within seven days of the change.

Z3.2 The *Consultant* is required to submit an updated verification certificate and necessary supporting documentation confirming the change in his B-BBEE status to the *Employer* within thirty days of the notification or as otherwise instructed by the *Employer*.

Z3.3 Where, as a result, the *Consultant's* B-BBEE status has decreased since the Contract Date the *Employer* may either re-negotiate this contract or alternatively, terminate the *Consultant's* obligation to Provide the Services.

Z3.4 Failure by the *Consultant* to notify the *Employer* of a change in its B-BBEE status may constitute a reason for termination. If the *Employer* terminates in terms of this clause, the procedures on termination are those stated in core clause 91. The payment on termination includes a deduction of the forecast of the additional cost to the *Employer* of completing the whole of the *service*s in addition to the amounts due in terms of core clause 92.1.

Z4 Ethics

Z4.1 Any offer, payment, consideration, or benefit of any kind made by the *Consultant* which constitutes or could be construed either directly or indirectly as an illegal or corrupt practice, as an inducement or reward for the award or in execution of this contract constitutes grounds for terminating the *Consultant's* obligation to Provide the Services or taking any other action as appropriate against the *Consultant* (including civil or criminal action).

Z4.2 The *Employer* may terminate the *Consultant's* obligation to Provide the Services if the *Consultant* (or any member of the *Consultant* where the *Consultant* constitutes a joint venture, consortium or other unincorporated grouping of two or more persons or organisations) is found guilty by a competent court, administrative or regulatory body of participating in illegal or corrupt practices.

Such practices include making of offers, payments, considerations, or benefits of any kind or otherwise, whether in connection with any procurement process or contract with the *Employer* or other people or organisations and including in circumstances where the *Consultant* or any such member is removed from the an approved vendor data base of the *Employer* as a consequence of such practice.

Z4.3 If the *Employer* terminates in terms of this clause, the procedures on termination are those stated in core clause 91. The payment on termination includes a deduction of the forecast of the additional cost to the *Employer* of completing the whole of the *service*s in addition to the amounts due in terms of core clause 92.1.

Z5 Confidentiality

Z5.1 The *Consultant* does not disclose or make any information arising from or in connection with this contract available to Others. This undertaking does not, however, apply to information which at the time of disclosure or thereafter, without default on the part of the *Consultant*, enters the public domain or to information which was already in the possession of the *Consultant* at the time of disclosure (evidenced by written records in existence at that time). Should the *Consultant* disclose information to Others in terms of clause 23.1, the *Consultant* ensures that the provisions of this clause are complied with by the recipient.

Z5.2 If the *Consultant* is uncertain about whether any such information is confidential, it is to be regarded as such until notified otherwise by the *Employer.*

Z5.3 In the event that the *Consultant* is, at any time, required by law to disclose any such information which is required to be kept confidential, the *Consultant*, to the extent permitted by law prior to disclosure, notifies the *Employer* so that an appropriate protection order and/or any other action can be taken if possible, prior to any disclosure. In the event that such protective order is not, or cannot, be obtained, then the *Consultant* may disclose that portion of the information which it is required to be disclosed by law and uses reasonable efforts to obtain assurances that confidential treatment will be afforded to the information so disclosed.

Z5.4 The taking of images (whether photographs, video footage or otherwise) of the *Employer*'s project works or any portion thereof, in the course of Providing the Services and after Completion, requires the prior written consent of the *Employer*. All rights in and to all such images vests exclusively in the *Employer*.

Z6 Waiver and estoppel: Add to core clause 12.3:

Z6.1 Any extension, concession, waiver or relaxation of any action stated in this contract by the Parties, or the *Adjudicator* does not constitute a waiver of rights, and does not give rise to an estoppel unless the Parties agree otherwise and confirm such agreement in writing.

Z7 Provision of a Tax Invoice. Add to core clause 51

Z7.1 The *Consultant* (if registered in South Africa in terms of the companies Act) is required to comply with the requirements of the Value Added Tax Act, no 89 of 1991 (as amended) and to include the *Employer*'s VAT number 4740101508 on each invoice he submits for payment.

Z8 Notifying compensation events

Z8.1 Delete from the last sentence in core clause 61.3, "unless the *Employer* should have notified the event to the *Consultant* but did not".

Z9 *Employer's* limitation of liability

Z9.1 The *Employer's* liability to the *Consultant* for the *Consultant's* indirect or consequential loss is limited to R0.00 (zero Rand)

Z10 Termination: Add to core clause 90.1, at the second main bullet point, fourth sub-bullet point, after the words "against it":

Z10.1 or had a business rescue order granted against it.

Z11 Delay damages: Addition to secondary Option X7 Delay damages (if applicable in this contract)

Z11.1 If the *Consultant's* payment of delay damages reaches the limits stated in this Contract Data for Option X7 or Options X5 and X7 used together, the *Employer* may terminate the *Consultant's* obligation to Provide the Services.

Z11.2 If the *Employer* terminates in terms of this clause, the procedures on termination are those stated in core clause 91. The payment on termination includes a deduction of the forecast of the additional cost to the *Employer* of completing the whole of the *service*s in addition to the amounts due in terms of core clause 92.1.

Annexure A: Notes to Consultants

This is guidance to Consultants to assist their decision making about what cover to arrange in the insurance to be provided by the Consultant. The guidance is not part of the contract and the Employer carries no liability for it. The Consultant must obtain its own advice.

1. For the purpose of works contracts, insurance provided by Eskom (the *Employer*) has been arranged on the basis of "project" or "contract" value, where the value is the total of the Prices at Completion of the whole of the works including VAT.

   A "project" is a collection of contracts or work packages to be undertaken as part of a single identified capital expansion or refurbishment of a particular asset or facility.

   A "contract" is a single contract not linked to or being part of a "project".

2. There are three main "formats" of cover and deductible structure; Format A, Format B and Format Dx.

   Format A is for a project or contract value less than or equal to R350M (three hundred and fifty million Rand) inclusive of VAT.

   Format B is for a project or contract value greater than R350M .(three hundred and fifty million Rand) inclusive of VAT.

   In the case of contracts / packages within a project:

   - For a contract / package of R50M which is part of a R400M project, Format B will apply
   - For a contract / package of R250M which is part of a R6 billion project, Format B will apply;
   - For a contract / package of R120M which is part of a R350M project Format A will apply;

   For a contract which is not part of a project the same limits apply:

   - For a contract of R50M, Format A will apply
   - For a contract of R355M, Format B will apply.

   Format Dx applies only to Distribution Division projects and contracts. If a Distribution Division project or contract exceeds the Format A limit, the Eskom Insurance Management Services [EIMS] need to be contacted for advice on how to formulate the insurance cover. Cover and deductibles for Distribution Division are per the relevant policy available on the internet web link given below.

   Format A generally applies to Transmission Division projects and contracts. If a Transmission Division project or contract exceeds the Format A limit, the Eskom Insurance Management Services [EIMS] need to be contacted for advice on how to formulate the insurance cover.

3. **Further information and full details of all Eskom provided policies and procedures may be obtained from:**

   http://www.eskom.co.za/Tenders/InsurancePoliciesProcedures/Pages/EIMS_Policies_From_1_April_2014_To_31_March_2015.aspx

4. The Insurance which the *Consultant* is to provide against his liability for claims made against him arising out of his failure to use reasonable skill and care (first row in the Insurance Table of clause 81.1 in the PSC3) should also indemnify the *Consultant* for those sums which he could become legally liable to pay as damages arising from any claim first made against him and reported to Insurers some time after Completion of the whole of the *service*s. Hence the *Consultant* needs to ensure that his cover is in place at least until all his liabilities under the contract have expired. Such claims could arise out of any negligent act, error or omission committed or alleged to have been committed by the *Consultant* in the conduct of professional services in connection with the contract.

C1.2 Contract Data

Part two - Data provided by the *Consultant*

Clause	Statement	Data	
10.1	The *Consultant* is (Name): Address Tel No. Fax No.		
22.1	The *key people* are: 1 Name: Job: Responsibilities: Qualifications: Experience: 2 Name: Job Responsibilities: Qualifications: Experience:		
Only if required		**CV's (and further *key persons* data including CVs) are appended to Tender Schedule entitled .**	
11.2(3)	The *completion date* for the whole of the *services* is	**13 January 2025**	
11.2(10)	The following matters will be included in the Risk Register		
11.2(13)	The *staff rates* are:	**name/designation**	**rate**
31.1	The programme identified in the Contract Data is	**As part of the Task Instruction**	
50.3	The *expenses* stated by the *Consultant* are	**item**	**amount**

0

PART 2: PRICING DATA

PSC3 Option E

Document reference	Title	No of pages
C2.1	Pricing assumptions: Option E	
C2.2	*Staff rates* and *expenses*	

C2.1 Pricing assumptions: Option E

1. How work is priced and assessed for payment

From Option E:

Identified and defined terms	11 11.2	(16) The Price for Services Provided to Date is the Time Charge for the work which has been completed. (19) The Prices are the Time Charge.

From the core clauses:

Identified and defined terms	11.2	(13) The Time Charge is the sum of the products of each of the *staff rates* multiplied by the total staff time appropriate to that rate properly spent on work in this contract.

and

Assessing the amount due	50.3	The amount due is • the Price for Services Provided to Date, • the amount of the *expenses* properly spent by the *Consultant* in Providing the Services and • other amounts to be paid to the *Consultant* less amounts to be paid by or retained from the *Consultant*. Any tax which the law requires the *Employer* to pay to the *Consultant* is included in the amount due.

2. Staff rates and expenses

Tendering consultants are advised to consult the NEC3 Professional Services Contract Guidance Notes before entering *staff rates* into Contract Data, or in C2.2 below.

This is because *staff rates* can be established in one of three ways:

- rates for named staff,
- rates for categories of staff or
- rates related to salaries paid to staff.

Rate adjustment for inflation, if necessary, can be based either on actual salary adjustments or by using Option X1: Price adjustment for inflation. See pages 13 and 14 of the PSC3 Guidance Notes.

Expenses associated with employing a staff member in Providing the Services are listed separately either by the *Employer* in Contract Data provided by the *Employer* or by the *Consultant* in Contract Data provided by the *Consultant*. As only the *expenses* listed may be claimed by the *Consultant*, all other cost to the *Consultant* associated with Providing the Services must be included within the *staff rates*.

Rate adjustment for inflation of *expenses* is explained on page 15 of the Guidance Notes.

C2.2 Staff rates and expenses

This section can be used when the *staff rates* and *expenses* are considerable in number and more conveniently located here than in the Contract Data. Entries in the Contract Data should refer to this section of Part 2.

Remember to state whether the *staff rates* and *expenses* exclude or include VAT.

The *staff rates* are:

No.	Designation (or category) or name of staff member	Rate per hour, excluding VAT
1	▪ Category A	R 1 759.00
2	▪ Category B	R 1 520.00
3	▪ Category C	R 982.00
4	▪ Category Other (e.g. Draughting & Administration)	R 604.00

The *expenses* are:

No.	Expense item	Amount / rate excluding VAT
5	▪ **Accommodation per night**	R 820.00
	▪ **Traveling per km**	R 6.50
7	▪ Other	Actual costs

The Works is subject to the following:

- A request for services/works will be given to the Consultant by the Employer, in its total discretion and on an 'as and when needed' basis, in the form of a Task Order/Instruction. Signatories of both parties on the Task Order/Instruction are required prior to any obligation being created for commencement of or payment for services/works.
- The Consultant should not commence with any services/works regarding any Task Order/Instruction without receiving the purchase order number (45# number) from the contract custodian.
- A Task Order/Instruction is an order/instruction by the Employer to perform services/works as nominated by the Employer from the skills and services/works category, in terms of the above Price List, for which the Consultant has been found by the Employer, in its total discretion, to have the relevant and present competency and capacity and no serious misconducts by key persons of the Consultant, alleged or otherwise."
- This contract is the only contract which can be used to request the services/works deemed to be survey services/works."
- The project duration is 24 months period. The rates will be Fixed and Firm in the First Year and thereafter the rates will be re-viewed based on market conditions

- Transportation costs will be adjusted either up or down on a six-monthly basis based on the Market Price for Fuel.
- Services – refers to Employer's requirements and the Task Instruction. A signatory of both parties on the Task Instruction is required prior to any work being commenced

***CONSULTANT*:**

…….	…….	…….
PRINT NAME	SIGNATURE	DATE

PART 3: SCOPE OF WORK

Document reference	Title	No of pages
	This cover page	1
C3.1	*Employer*'s Scope	60
C3.2	*Consultant's* Scope	0
	Total number of pages	

C3.1: EMPLOYER'S SCOPE

1 Description of the *services*

1.1 *Employer's Objective*

This contract is for the provision of external NED (Network Engineering & Design) Professional Services, required by the Employer for work
in the ***Cape Coastal Cluster*** .
The scope of services and requirements, subject to the area of competency of the Consultant and the Task Instruction issued by the Employer, are partly elaborated in the following annexures:

Annexure	Professional Services Scope	Eskom Business Unit
A	***NED Professional Services for Design and Design implementation***	
A1	Electrification (Conventional)	NED
A2	Sub-Transmission Power Lines	NED
A3	New Medium Voltage Lines	NED
A4	MV and LV Line Refurbishment	NED
A5	General Substation Power Plant Design	NED
A6	General Substation Civil/Geotechnical Work Design Substation Drawing Work	NED
A7	General Control Plant Design. Electrical Engineering Services for Control Plant	NED

Updated and further works information will be issued with the relevant Task Instruction, where required.

Receivables
* The Employer will provide access to the relevant project sites, restricted access to relevant Eskom Premises (during working hours) for consultation with Employer stakeholders, restricted access to relevant Eskom Premises (during working hours) for use of computer equipment and software (where applicable) and network plant for technical evaluation and investigative purposes, where relevant and agreed to as per Task Instruction.

* The Employer shall have the right to inspections of all works and shall insist on existing or introduce new holding points, so as to ensure the necessary quality of services and works.

* The Employer shall have the right to allocate Task Instructions to the Consultant for services, which are subject to the competency and capacity the Employer deems the Consultants to have at any given point in time.

The annexures and additional documentation provided with Task Instructions will provide further details.

Deliverables
* The Consultant is to submit a first Project or Task Specific programme for acceptance within two weeks of the Contract Date or Task Instruction, respectively.

* The quality policy statement and quality plan, first Project or Task Specific, are to be provided within two weeks of the Contract Date or Task Instruction, respectively.

* Where relevant, risk assessments, which are site, project and task specific, are required from the Consultant.

See annexures for further details.

Specifications and Data Item Descriptions

See annexures for details.

Activity List (Work Breakdown)

The following are categories of services/works that may be required, subject to the competency and
capacity that the Employer deems the Consultants to have at any given point in time, some of which are
further elaborated in the Annexures:

Project Phase Category of Works	***Plant Category for Technical Works***
PROJECT ENGINEERING/DESIGN	*SUBSTATION DESIGN*
PROJECT PROCUREMENTS	*Power Plant*
PROJECT MANAGEMENT	*Control Plant*
PROJECT SITE SUPERVISION	*Civil Work*
DATA CAPTURING & ADMINISTRATION	*HIGH VOLTAGE LINES (>=kV)*
	MEDIUM VOLTAGE LINES (<kV)
	MV LINE EQUIPMENT (e.g. Capacitors,
	Regulators & Recloser)
	LIGHT VOLTAGE LINES (<1000V)
	ELECTRIFICATION

Annexure A - NED Professional Services for Design and /or Application

Network Engineering & Design

A1 Electrification (Conventional/Developer)

TECHNICAL REQUIREMENTS

Glossary

COW – Clerk of the works
CPE – Contracting Project Engineer
C Value – Ratio between conductor tension and mass used for catenary files
DT (IARC) - Distribution Technology/Industry association Resource Centre
CRA – Concept release approval
FSOW – Functional scope of Works Meeting
DRT/TEC – Design Review Team (formally Technical Evaluation Committee)
DRA – Definition release approval
ERA – Execution release approval
FRA – Finalisation release approval
FEM – Financial evaluation model
IV – Intermediate voltage 1000-3300 V
LV – Low voltage effective range between 50 – 1000 V
MV – Medium voltage effective range between 1000 – 33000V
Power office – Eskom tool for producing inter alia BOM's costing and associated
PIC – Regional investment committee (Provincial Investment Committee)
SWER – MV technology which uses the ground as an electrical return circuit

T&Q – Technology and Quality (SI – Standards Implementation)

1. Data and drawing requirements

The Land development drawing and data requirements are set out in the appended documents

- SPECIFICATION FOR THE SUPPLY OF LAND DEVELOPMENT DATA COMPONENTS, Rev3 14-04-2004

- STANDARDISATION OF ELECTRIFICATION DRAWINGS CAPE COASTAL CLUSTER PART 1 URBAN DEVELOPMENT

2. Statutory requirements and standards.

All activities shall comply with the statutory requirements and where possible, within the ambit of the relevant guidelines, inter alia.

- The Occupational Health and Safety Act 85 of 1993.(revision applicable to the dates in this contract)
- The relevant standards and codes of practice, whether NRS, SABS or BS.
- The requirements of Eskom Standards applicable on the date of this brief. The standards are available through Group Technology and SI

The Contracting Project Engineer is to take due cognisance of exemptions from the Act, as given by the Chief Inspector.

The contracting Project Engineer is responsible for the complete electrical design and installation of plant in terms the current Occupational Health and Safety Act. 85 of 1993.

The Contracting Project Engineer is to note that when drawings are submitted for approval, a principled approval on the proposed reticulation system and technology choice will be given, not on the details contained in the drawings. The Contracting Project Engineer will remain responsible for effective utilisation of infrastructure to be installed and will be subject to post construction audits.

It is required that a consulting Project Engineer should be formally appointed at the design approval stage for the scope and duration of a given project. He will be responsible to the Eskom Design Project Engineer in all issues relating to Design.

3. Brief

This brief sets out the principled design requirements for the project as detailed above.
The CPE is to provide the relevant outputs as described below at the appropriate stage of the project taking due cognizance of all the technologies allowed for in the various standards, and where the standard technologies do not permit to provide the appropriate technological solution which shall be in accordance with the principles of the standards as well as the local specific requirements as set out in the sections below.

In line with the project engineering process and the form of agreement for consulting services for electrification projects with specific local output requirements, the project is divided into two distinct phases, viz.

4.1 The pre engineering phase.

Where the overall design requirements as set out in this brief are contemplated and a preliminary detailed design strategy with specific requirements based on representative sample models derived from the proposed project area will be offered to the Functional Scope of Works and **(DRT/TEC)Technical Evaluation Committees** for support/approval. The requirements are as follows:

- Compliance with the FSOW/TEC process including arrangements and bookings.
- Preparation of a power point presentation which should include the following aspects - to be reviewed before presentation.
- A large scale topographical drawing (1:50 000 –10 000) of the project area showing the MV routes and transformer positions.
- A proposed single line diagram showing details of the MV intake voltage, protection, metering, MV conductor size, line configuration and transformer installations.
- Proposed MV and LV structure types.

- A detailed design of the project's transformer areas showing transformer, protection, conductor and service details together with the relevant Reticmaster files for initial and pre upgrade values. Resultant transformer, conductor and service loss, are to be summated for the various load values and included in the schedule of findings, as well as worst case LV fault level values. The study reports required for the TEC presentation include; Draw input, Draw output and Voltage profile.

- A cost estimate based on material costs for a coded, detailed design of a representative sample area, large enough to provide 95% accuracy for final material requirements when extrapolated to the full extent of the project. A coded BMS bill of packages and cost projection in the CIP format is required.

- Detailed information regarding house service connection techniques to be used.

This applies when techniques different to those contemplated in the standard are offered.

- A complete set of "Bench mark indicators" for the project.
- Detailed information regarding the upgrade strategy to be applied, the design parameters used with regard to ADMD selection, expected load growth and the impact of the technology choice and application on the greater Eskom business.
- A completed schedule of findings where the minimum requirements and settings are specified. The required additional information which is to be provided by the CPE shows compliance with core criteria, highlights departures and provides for a summarised project description which cross checks all the project information provided in the other submissions.
- A "load Balancing schedule" which shall show the prospective load balancing with reference to the affected MV system.

- A schedule of the complete detailed design package in terms of contents and timing of control points, to be made available should the TEC approve the project.

- **The contracting Project Engineer is to ensure that the correct process is followed during the pre- engineering phase with specific reference to stakeholder inputs, pre FSOW/TEC checks and and bookings.**

Ensure that you get the most current revision of both FSOW and TEC power point presentations from the Secretary before preparing and submitted the documentation for inclusion on the meeting agenda's.

4.2 Implementation.

Where the design proposal as offered and accepted by the Technical Evaluation Committee is implemented. At this stage the contracting Project Engineer is considered to be an extension of the Design Section and fully accountable to the Project engineering Manager in all matters relating to inter alia; design, quality, safety, compliance with this brief and associated standards. In order to the achieve this, the relevant detailed project information as required in terms of the brief shall be provided at this time. Specific requirements and control points are as follows.

- Detailed design check, where the designs are checked for compliance with the relevant detailed output requirements as well ensuring that the detailed designs are in keeping with the design proposals. Specific items which are to be presented for checking include.
- The final as pegged and verified drawings.
- The sample installation proposal. (Layout and structure package.)
- The package of structures to be made available for the contractor and clerks of work.
- A sample section of the overhead line profile which will show the templating technique for long and/or shared systems (MV and LV). The sample is to be representative of the technique to be applied to the project.
- Sag and tension tables applicable to the project.
- The updated single line diagram.
- An updated material and techniques schedule, the material supply chain and specification references are fundamental to this schedule.

A complete Project engineering package which shall include inter alia, the latest amended, marked up, structure drawings, general layout, spanning sheets, S&T charts, preliminary single line diagram, implementation plan and material schedule that is intended for and which is referenced to this specific project shall be made available for the Eskom Clerk of Works and the Contractor. The CPE is to ensure that this package is discussed with the Eskom project engineer before implementation – furthermore where components are not available for inclusion at the time of compiling the package, reference shall be recorded in the package together with the prospective date for inclusion.

- Sample installation check. Where a member from design checks the sample installation for technical compliance.

- Management of design changes as required by unforeseen situations, i.e. material shortages. The mechanism for this is design change request form. Any departures from the requirements of this brief that require design approval shall be in writing as the contents of this brief will be the criteria against which the design issues will be audited.
- The pre commissioning check shall be completed by the consulting project engineer and a declaration signed by him stating clearly that, **"The responsible Engineer and/or consulting firm responsible for the design shall warrant that the design is fit for purpose and was constructed in accordance with the relevant standards and in terms of the brief." In this regard, the said Engineer and/or firm shall indemnify Eskom against all liability, damages, expenses and/or loss which may incur as a result of the design not being fit for purpose and/or construction be of poor quality, should the system require upgrading* before the expiration of five years. In the event of an early upgrading, it will not be necessary for Eskom to prove the design was not fit for purpose but the onus shall be on the responsible Engineer and/or firm responsible for the design to prove that it was fit for purpose and/or that the early upgrading* was not unreasonable.**

Upgrading in this context refers to premature repairs, retrofitting due to design inadequacies etc.
Post commissioning report. A final design report shall be provided that will highlight deviations from the initial proposal as well as the final values obtained from the project with specific reference to 3.1.7. **A signed declaration shall be included in this report.**

Within Electrification there is a drive to continually lower the cost per connection to the point where only the projects which cost less than the required maximum allowable cost criteria will be recommended for further processing i.e. CIC presentation. With due consideration of the above phased design and execution stages, provide the complete electrical design as determined by the initiator, taking due cognizance of: The local electrical system and emerging masterplan for the specific local project area.

The full range of technologies and requirements of the Distribution Standards.

• Where structures depicted in the Distribution standards do not meet the requirements of a particular project, and/or have an obvious error the CPE is to notify the Eskom Project Engineer by way of a design change request or a noncompliance report whichever is appropriate. Furthermore an acceptable structure which complies with the requirements of the specific issues set out in this brief are to be offered to the Eskom project engineer for approval before implementation. Note: A local standard structure/drawing should be considered before offering a new proposal.
• Drawing requirements as specified by the Land Development department.

• Specific issues that would impact on the local depot and operational requirements that can be addressed within the ambit of the Distribution standards. **The Contracting Project Engineer shall canvass the relevant stakeholder so as allow for the provision of meaningful input with regard to these issues.** This should take place after the design brief and before the presentation to the TEC. In this regard it is mandatory for the routing form to be signed off in sequence by the relevant stakeholders so as to allow for the added information to serve as a basis for meaningful input by the following stakeholder. Stakeholders may refuse discussion unless relevant information has been compiled. The relevant stakeholders are to be given at least one week's notice of intended discussions. Final TEC bookings will be dependant on the routing form being signed off in the correct sequence.

Note: While the stakeholders input are considered important, the specific requirements are to be recorded on the standard form for the TEC to note. The CPE is obliged to weigh off the requirements from all the various inputs and proposed what is considered the most appropriate design which is in keeping with the intention of the standards. The TEC shall have the final ruling on issues which require a local influence which may appear to be contrary to the standards.

Specific requirements as given below.

4.3 Design ADMD and Technology Choice

The latest Eskom design technology is to be used. The Distribution Standards are to be used as a source of reference. Specific issues not included in the Standards can be brought to the attention of the Electrification Design department. The following local requirements should be noted.
• Covered MV conductor is not to be used as a design option.
• Medium voltage conductors are to be installed along thoroughfares and not midblock in areas that are formally laid out, there would be obvious exceptions. While the **minimum** ADMD/Alpha - Beta* and circuit breaker settings** will be specified, the Contracting Project Engineer is to use a design ADMD which is appropriate for the proposed reticulation area in order to achieve the most cost effective reticulation design in view of life cycle costs. The design shall allow for natural growth so that no upgrades will be required within the first five years after commissioning. The large power users are to be identified at the time of design and plant deployment shall include these prospective connections. Only large power users that develop after the construction stage that could not have been foreseen by the contractor and /or new reticulation areas will qualify for indemnity against compensation for additional plant that may be required within the first five years.
*Alpha and Beta settings will be linked to the expected consumer load profile. **The circuit breaker settings will be linked to the BDMD of the relevant curve. **The basis on which the design ADMD/S is selected must be included in the design proposal as well as the report of the design package**

Where the MV voltage equals and/or exceeds 100%, a maximum boost of 2.5% may be applied to transformers, which have a nominal secondary of 415/242 volts. Example, should the light load voltage be 101% and the full load voltage be 96% and the transformer secondary voltage be 242 volts, then the maximum additional boost that may be applied is 2.5 or 3% dependant on the transformer tap specification. The nominal reference secondary voltage before boost, the boost %, design load regulation and the secondary design load bushing voltage shall be clearly

indicated in the voltage model. The minimum acceptable initial design characteristic ADMD will be in accordance with the requirements of the schedule of findings with respect to domestic consumers.**
This will be measured as the maximum half hourly demand for the project area, less the large power user's influence on the maximum demand divided by the number of consumers that constitute the project. The correct diversity factors for specific load segments will have to be determined by the engineer.
The effective application of this ADMD will be linked to a pragmatic upgrade path consistent with the potential for growth within the project area.
Principled requirements for the upgrade path, which is to be the most cost effective approach taking cognizance of issues below which are, inter alia:
- **Aim at lowest acceptable initial design value.**
- **Make optimum use of a given system's power transfer capability (efficiency of power reticulation)**
- **Use a standard upgrade strategy which is;**
- **Easy to implement,**
- **Will allow for well planned optimal load centres,**
- **Will have minimum impact on surrounding reticulation,**
- **Will have a minimum impact on administrative, control and data related issues.**

The emphasis is on appropriate, innovative and cost effective engineering designs to meet the demand for lower connection costs.

4.4 Innovative designs must meet the following design criteria.

- Ability to use standard equipment, readily available.
- Simple to install, maintain and upgrade.

4.5 Detailed electrical design

Medium voltage intake or bulk supply

For most projects either of two forms of bulk supply will be made available, viz.
Supply direct from an Eskom network or supply through a local authority supply system.

Through consultation with the primary stakeholder, the Contracting Project Engineer is to determine the most cost effective supply arrangement to be used in terms of technology application and sustainable or medium term system voltage level.

Where bulk power is made available from a local authority, it could result in a "wheel arrangement", where power is transferred through the existing supply network to the township and/or minor reticulation extensions. This could require that refurbishment to the existing supply system should take place.
The following must be considered with regard to "wheel arrangements".
- The cost saving to be realised.
- The potential effect of additional load on the existing local authority's supply network.
- The expected quality of supply.
- The effect on the metering arrangement.
- Protection arrangement. (Availability of SEF where open wire MV systems are to be built.)
- The expected loss profile due to load. Loss report to be included in Design report. Should a "wheel arrangement" take place, the bulk supply point shall be as arranged with the local authority via the municipal terminal. Before providing a design that would include a "wheel arrangement", the Contracting Project Engineer is to ensure that the proposal is acceptable to the Local Authority, and the terms of acceptance must be conveyed to the Project leader so that an agreement can be drawn up between Eskom and the Local Authority.

Where bulk supply is directly from Eskom, MV bulk supply intake points will be made available, **together with appropriate technology options which will have to be verified during the pre engineering phase, i.e. SWER, single phase systems.**
These will be shown on the single line diagram issued by the Planning Department.
Fault levels will be indicated. **Where the given MV voltage equals and/or exceeds 100%*, a maximum boost of 2.5% may be applied to transformers which have a 420 volt secondary. This principle will automatically apply to the volt drop modelling.**

4.6 Based on the light load or normal load condition.

The CPE is to ensure that the final network configuration "as built" is balanced in accordance within specific requirements of the Network reticulation analyst where applicable, and/or is balanced in terms of the approved network deployment, referred to both the MV and LV networks. This requirement is pertinent to both the initial and upgraded network implementation requirements.

4.7 Internal reticulation

Where networks exist that are in reasonable condition, the Contracting Project Engineer will be required to evaluate the cost effectiveness of retaining the whole or part of the existing network and its inclusion in the layout design proposal. Important criteria in determination of the usefulness of a given existing network, also considerations for new networks where applicable, would include, inter alia,

- General condition of the network.

- The potential for efficient use of the existing infrastructure when considering the expected township development, expected loads and connection policy.
- Operation and maintenance requirements.
- Inventory/strategic spares requirements.
- Exiting street lighting arrangement and future policy.
- Existing earthing arrangement.
- Existing protection arrangement.
- Existing consumer connection arrangement.
- The potential for upgrades to the network.

Should the Contracting Project Engineer wish to make use of existing infrastructure that will need upgrading, the appropriate measures as well as material requirements must be included in the design report. This is particularly important with regard to protection and measurement issues so that the relevant Eskom specialists can be consulted.

4.8 Protection

Compliance with the various protection philosophy documents included in the standards as well as discussion with the HOPE is required. The obvious correlation between protection and earthing is to be continuously contemplated when considering the holistic design.
- The CPE is to ensure that the protection will operate within reasonable limits, with regard to low voltage feeders. Standard fuse element ratings are to be in accordance with the LV standard. Where open wire systems are to be installed, the protection shall operate in the event of a phase to neutral clash. Fault throwing during the commissioning phase may be requested by the Area project engineer, in order to confirm fuse operation. Service cables shall not exceed 60 meters. However, where these do exceed 60 meters, the above tests are mandatory. The worst case system fault level shall be indicated in the electrical design submission.

• The CPE shall ensure that the mandatory installation tests for new installations are completed, refer Technical instruction 01TI –04 R0 and 01TI – 02 R0. These instructions include, inter alia, the single-phase loop impedance and protection ratings, system service cable and installation insulation, polarity and integrity.

• Maximum fuse rating labels are to be installed at:
• SWER 19 kV fuse positions (where no SWER recloser has been installed)
• All LV main and sub fuse positions.

4.9 Metering

• The metering policy for a specific town, village or area will be determined in accordance with the requirements of the energy balancing and statistical metering policies. The details of these requirements will be implemented according to the specific site requirements. Two basic packages will be available, viz. Bulk Metering where measurements are taken on the MV system and Low Voltage Metering where measurements are taken at the transformer installations.

• The metering strategy which is to be applied shall be in accordance with the planning master plan as discussed with the relevant reticulation planner where it is envisaged that summation MV bulk point metering will be the norm, LV metering will be deployed in limited applications.

4.10 Earthing

• The earthing requirements are as per the Distribution Standard. Contracting Project Engineer will be responsible for ensuring that soil resistivity tests are carried out, and that the earthing design is completed and included in the final design package. Final earth values are to be measured and included in the final report.
• For SWER systems, the earthing requirements are set out in the Distribution Standard Part 4 * Available from DT. (Draft) The CPE is to ensure that the soil resistivity tests are carried out and that the earthing design is completed and submitted to the Eskom project engineer for approval before the final BOM is completed. Members from DT are to be consulted regarding specific earthing issuesrefer Telkom clearance and shared structures.

4.11 Telkom clearances and shared structures

• The principals as stated in the draft/document: code of practice for the joint use of a pole route for power and communication lines **NRS 043** are to be followed. Due cognizance must be taken off Telkom routes, crossings and clearances, with special regard to the following.

• The use of kicker poles.
• The length of service conductor required.
• The use of mid block reticulation.
• Due to the potential risk that the proposed use of SWER technology mayinterfere with and/or induce stray voltages/currents into Telkom circuits, it isimportant to determine where the proposed SWER scheme is likely to impact on the existing or future Telkom networks in terms of earthing, induction and/or harmonic interference. Where these are identified, the specialist calculations required in order to determine separation distances are to be completed by DT at the request of and within the project schedule of the CPE. In this regard layout design interventions may be required to obviate interference.

4.12 Equipment structures and clearances

The Contracting Project Engineer is to ensure that structures are uncluttered with regard to the amount of equipment installed and shall ensure that provision is made for safe and easy operational practice.

This is especially pertinent to strain poles, switching points and transformer structures. Medium Voltage routes are to be as straight and simple as possible**.**

Correct sag and tension techniques are to be used.
Should the CPE contemplate offering structures that will require intermediate structures when stringing a second conductor for upgrade purposes the following should be noted.

All strain and angle structures shall be rated for the full mechanical load of the upgraded system. This implies that all stays shall be rated for the final mechanical loading as well.

Where additional intermediate structure shall be required in the event of an upgrade, these are to be marked up on the sample proposal as well as the "as built" drawings; furthermore the required positions shall be practicable. In order to limit vehicular damage to overhead lines (typically LV and services) where these are installed within the rural villages as well as to provide a practical means to support the clearance requirements of the distribution standard the following is required.

The CPE is to engage the JEWC* during the initial stage of the project so as to identify and agree on specific internal routes which are to be used for vehicular traffic within the various villages comprising the project. Without compromising the distribution standards, these routes shall be indicated on the design and "as built" drawings and will have a minimum clearance of 4.7 M. (Main routes that are easily identified and/or where the provincial authorities carry out maintenance will automatically require the necessary ground clearance in terms of the standard.)

This action is intended to:
- **Limit the incorrect interpretation of the required clearance values.**
- **Gain community support and involvement in providing cost effective reticulation.**
- **Prevent incidents that will impact on operation, maintenance and safety issues.**

*** Joint electrical working committee or similar group.**

4.13 Connections

The CPE shall take due cognisance of the requirements relating to the application of concentric cable and the installation certificate for the ECU.
The following principles apply to connections.

- **New connections. Both SNE and CNE services may be provided according to the service conductor, which may arrive at a given site. The specific requirements associated with each of the cable types shall be strictly adhered to.**
- **The CPE shall take due cognizance of the requirements relating to the application of concentric cable and the installation certificate for the ECU.**

As discussed in "protection" it may be required that a loop impedance (to confirm the prospective fault level) as well as pressure tests should be included in the installation testing procedure therefore allowance should be made in terms of time and cost.

4.14 System voltage and volt drop calculations

The voltage profile, given as a percentage of nominal, applicable to Eskom specified MV:
Max Voltage 102.5%
Min Voltage 95 %.

The contracting project engineer in conjunction with the relevant reticulation Planner is to take cognizance expected medium term voltage at the MV intake point for the project.
Shall apply a strategy that will allow for cost effective reticulation in terms of LV feeder lengths and transformer tapping, and shall ensure that the systems included the designs will meet the statutory requirements for the end user. i.e. 230V +- 10%. Reticmaster is to be the design tool that is used for volt drop calculations. On completion of the project, the model files are to be provided which reflect the as built system and connections.

5 Materials

5.1 Specific requirements relating to Materials, Techniques and Standards.

Except for allowances made below, all designs offered shall comply with the detailed requirements the Eskom Distribution Standards as amended on the date of invitation to tender. With specific reference to materials offered, all materials must be new, of the best quality and shall conform to the requirements of the Eskom Buyers Guide (Eskom Distribution Standard Part9).

- A preferred manufacturers schedule has been included in the annexures. It is required that prospective contractors should use this schedule in order to procure the various components to be used on this project. In the event that the prospective contractor intends to procure items from manufacturer/s, which do not appear on the schedule, the contractor shall provide test certificates which, shall have been approved by DT in terms of the process set out below
- Material options will be as determined in the standard design packages.

The standard design codes applicable to the Eastern Cape Operating Unit are to be used as a reference. Where specific site circumstances or technology changes which are ahead of the commercial processes require non-standard material applications and/or due to shortcomings of the standard packages, the Area project engineer shall develop “ad Hoc” packages and submit these to the PES for approval before implementation. The components within the design packages are to be in compliance with the Eskom specification, however should the specification not be available, then DT approval will be required, for the specification reference, the test facility or both. The CPE is to ensure that the design material requirements are available, if not; a design strategy should be applied to allow for alternatives.

Where the BOM and or the design scope changes to require additional materials via logistics, a deviation approval request, providing the causes as well as the costs of the change shall be forwarded to the Eskom project engineer for approval before implementation. This serves as a control mechanism to check design applications, as well as BOM accuracy related to design codes/packages/CIP/SAP.

5.2 Distribution transformers to be considered for electrification:

Primary	kVA	Configuration	Specification
22&11 100	100 & 50	Three phase	SABS 780
22,19 &11	32	Dual phase	SABS 780
22,19 &11	16	Single phase	SABS 780

• Where transformers are of the non-CSP type, the Area project engineer shall allow for reasonable operational requirements and transformer protection. Fuse element ratings are to be determined by the Area project engineer and shall be in accordance with the LV protection policy.

• Wood poles (55 Mpa.) are to be correctly rated to loads required, with the emphasis appropriate efficient usage. Single pole structures which are to support transformers rated at 100 kVA or larger, are to have a minimum pole top diameter of 200 mm. The CPE is to note and comply with the requirements relating to marking and inspection of wood poles.

• Steel wire is not to be considered as a design option.

6 Requirements in terms of procedures and reports.

6.1 Bill of packages, estimated cost per connection and indicators:

Where required, a bill of materials (BOM) and cost shall be derived from a bill of packages derived from regional package design codes. The regional package design codes will be made available be the regional T&Q department. The output input format for data transfer will be as specified by the regional Data Manager. This shall be achieved by utilising the terminal made available by project engineering or by licensed remote terminals. Outputs generated from specialist design tools i.e. Power Office, CART are acceptable, provided that the Design outputs meet the above criteria. The CPE shall check the BOM for accuracy and report discrepancies to the Eskom project engineer. The contracting Project Engineer shall liaise directly with the Project Services section in all issues relating to Data flow.

At DRA stage the BOM may be based on an extrapolated sample. This BOM shall have an accuracy level of 85% in terms of cost when compared to the final design. It is the CPE's responsibility to update and present the DRA to the Eskom project engineer for further processing; therefore the CPE shall ensure that the costs are classified according to DRA input requirements. A set of Benchmark Indicators shall be provided for each project area determined by an engineering reference. The values provided in the pre engineering indicators may be extrapolated from a sample but the accuracy levels are required to be 95**%. A standard indicator sheet, included in the annexures is to be used for this purpose.**

6.2 Single Line Diagram

Single line diagrams shall be configured, verified and provided to the "Reni" section in accordance with the single line diagram management process. In terms of this process, the CPE is directly responsible for the correct SLD being implemented.

6.3 Line, transformer and customer numbering.

The relevant numbering standards SRD001 and SRD 002 shall be used as the basis for creating customer identification. The Contracting Project Engineer is to allocate consumer identification labels in accordance with the above local standard, transformer supply zones are to be shown.

6.4 Schedule of Drawings Required

• The single line diagram of the MV reticulation including protection and metering symbols.
• The MV layout of the whole township is to be shown on one drawing.
• Drawings to a suitable scale as follows:
• A drawing showing, the proposed MV and LV reticulation, structure activity codes and numbered transformer positions are required.
• Drawings as required in 11.3.1. as a base lay with additional individual lays to indicate,

• Customer Connections

- Customer ID and Erf numbers (where available),6 letter structure activity codes are not required.
- A set of A4 drawings per project area, each drawing showing the individual transformer area as well as the coded low voltage reticulation emanating from the transformer. These drawings are to represent the “as built” condition at the time of handover, are to be bound into a booklet and handed to the relevant Maintenance Centre Manager.

6.5 Approvals

The contracting project engineer shall obtain the statutory approvals for the construction of this project on behalf of ESKOM from the Authorities concerned. This is especially pertinent to Eskom services traversing privately owned land.

6.6 Specification and findings schedule

A basic schedule providing relevant information required for project orientation and definition is included. The contracting project engineer shall check the existing information, effect change where necessary and add information obtained from the relevant stakeholder in so much as it will have an effect on the design component.

6.7 Accuracy

The network layout must be based on both cadastral information and existing site conditions. The structure types and especially pole lengths indicated must also suit these conditions.

6.8 Site meeting

Site meetings will be co-ordinated by the contracting project engineer.

6.9 Design change requests. (Deviation approvals)

Where non Eskom standard techniques or material types in force at the time of the brief are being proposed, written application with detailed calculations and/or test certificates to support the request (where applicable), must be forwarded to the
Eskom project engineer for approval, thereafter written approval for specific project implementation will be granted or denied. These requests will only be considered if submitted on the standard request form. A copy of this approval must be forwarded to the project leader or delegated COW for written acceptance before becoming effective.

6.10 Materials, procedures and design report form.

Where issues that need design corrective measures are encountered, the above form shall be forwarded to the Project Engineer. It may be required that where latent faults or issues relating to poor design or workmanship are encountered by field staff, the contracting Project Engineer will be required to respond to such a report with corrective action proposals.

6.11 Site visits and site instructions

The project engineering function will have automatic right to site visits; however, all requirements will be forwarded to the contracting project engineer except where obvious irregularities which may impact on safety are concerned. A site book will be signed if available.

6.12 Loss report

A loss report shall be included in the initial design report and should allow for transformer and LV reticulation losses per transformer area at initial, pre upgrade and final design load values.

6.13 Sample installation

A sample installation is required for the project. This sample installation shall include the tendered commodities and construction techniques applicable to the project and shall be built at a central point during site establishment and shall be approved before construction commences. Where Eskom construction is the contractor, the first transformer area will be used as the sample area**. It must be noted that should the situation arise that Eskom construction have not built the installation according to the detailed design drawings submitted by the CPE, the whole installation shall be corrected at the cost of Eskom construction. Where incorrect drawings have been supplied by the CPE, a claim shall be instituted against the CPE to allow for the installation to be made good.** A standard format is included in the annexures. The contracting Project Engineer shall give the Eskom project engineer two weeks notice for this installation to be checked, a date will then be agreed between the parties. In the event of Eskom members rationalising area visits, this will be communicated and in order not to cause project delays the following principles will apply.

• The CPE is to give interim approval for the sample installation after he is satisfied that the sample installation meets the following criteria;

• Requirements of the Eastern Cape Operating Unit's buyers guide.

• Requirements of the relevant standards and the detailed design package including deviation approvals.

• Requirements of relevant Design bulletins.

• A date will be agreed for a member of design to review the sample installations together the contracting Project Engineer so as to ensure compliance with the relevant design requirements in force as set out above.
Once approved the techniques will serve as a standard reference for the project.

6.14 Schools

The CPE is to produce a schedule which is to be used in the schools electrification program. The schedule shall include, inter alia:

• Categories in terms of distance from anticipated networks.

• Schools that are situated within the proposed electrification project zone.

• Schools that are situated within 3 KM of the proposed electrification zone that will not be included in a future electrification project.

• Expected load allocations to the school.

• System requirements for the proposed school supply, i.e. Standard connection from the proposed system or a dedicated MV line and transformer installation.

• Estimated number of classrooms.

• General condition of the school.

Notwithstanding the above, where schools are to receive an immediate pre-paid connection, a 10 mm2 shall be used as the default service conductor size

6.15 Final report.

Detailed requirements to be included in the final report are, inter alia;

- Final single line diagram, information is to be provided in terms of the pre engineering requirements, viz. protection (MV, LV and Tfr.), metering, system configuration, load balancing and prefixes.

- Revised bench mark indicators for the project, showing deviations from the F10 proposal.

- A schedule which shows the as built drawing reference numbers as well as the final revision numbers furthermore the schedule shall provide for the signing off of the received drawings by the Eskom recipient.

- A schedule which shall provide details of the energy balancing metering installations, viz. Project name, Transformer/Auxiliary No., Eskom No., and commissioning date of meter.

- A schedule providing details of the file names of the electronic volt drop and loss files.

- A schedule providing details relating to the earth installations, viz, Project name, Transformer/auxiliary No. and final earth value attained.

- A schedule which shall provide details relating to the installation of power driven stays, viz. Project name, power stay contractors details, quantity of stays successfully installed per category with relevant details, also details of installations where power stays were not successful.

- Copies of the approved design changes applicable to this project.

- The signed declaration by the responsible engineer who shall verify that the plant has been installed in accordance with the requirements of this brief and required specifications and standards by virtue of a personal site check.

6.16 Project reference

All correspondence with the Eskom Design Project Engineer relating to the scope of this brief in so much as it affects a given transformer zone shall have a specific reference. Where deviations are requested a separate deviation request per transformer zone together with the engineering reference shall be provided. The project schedule shall have the relevant cross referencing required to determine villages affected by a specific transformer zone. The engineering reference specific to these projects is/are: **Refer SRD001 & 2**

6.17 Project parameters

Notwithstanding the requirements set out in 4**, the minimum load parameters for these projects are:**

Parameter	Initial	Final
Alpha	0.28	0.32
Beta	1.68	1.41
Circuit Breaker	20	20
kVA/customer(transformer) – includes max 130 % inclusive.	0.65	0.86

6.18 Report format

All project engineering reports shall be made available in hard copy as well as electronic format.
I …….. appointed as CPE for the above project understand and accept the requirements set out in the above brief.
Signed:
Date:

6.19 Table of supporting documents/ appendages required.

Name	Function	Requirement	Project stage
Stakeholders comments	To ensure stakeholder inputs are included in the proposed engineering solution	PE to ensure signed off in order.	TEC
Benchmark indicators	Ensures design criteria is within specified norms	To be completed and updated during key project phases, with deviations highlighted in closing report.	TEC, FDP, Final report.
Specification and findings schedule	Summary of project technical parameters	To be completed and confirmed by PE.	TEC
TEC scope check list (Plant) PSLD and protection requirements	Specific MV protection settings for the project	To be discussed and confirmed, RNA and HOPE.	TEC, FDP, final report.

A2 Subtransmission Lines

Process for Proposed Sub Transmission Power Line

A2.1 LAND DEVELOPMENT – EASTERN CAPE OPERATING UNIT

1. Land Development Surveyor to select possible route using 1:50000 Topographical sheets and aerial photography where available

2. Land Development to arrange for the Aerial Survey as per the Spec for Aerial Surveys. A Co-ordinate list of the Prelim route to be supplied by Land Development to the company contracted to perform the aerial survey.

3. Land Development to receive aerial photography and the Lidar Point Files on completion of the Aerial Survey.

4. **Land Development Surveyor or Consultant appointed by Land Development will optimise the route.**

5. **The optimisation is to be executed in conjunction with the Land Development Surveyor to determine the final proposed route.**

6. **Final Optimised PLS CAD Hard Copy Drawings and the Electronic Files are to be supplied to a Land Development representative by the consultant responsible for the Optimisation. The package should include a Co-ordinate list for the route.**

7. **The Land Development Surveyor responsible for the proposed route should supply the information for Statutory Approvals. Application for approvals to be submitted.**

8. The Consultant to proceed with the documentation for Contract Management.

9. **On completion of the Pegging of the route, the revised PLS CAD Hard Copy Drawings and the Electronic Files are to be supplied to a Land Development representative by the Consultant/Project Engineer The package should include a co-ordinate list for the route**

10. **Re-apply for approvals if necessary - the Land Development Surveyor responsible for the proposed route to advise.**

11. **On the completion of the construction of the power line, the Consultant should supply the Land Development representative, within two week of commissioning, with the following final 'AS BUILT' information:**

11.1 Spanning Sheets as per Eskom Eastern Cape Operating Unit Specification Hard copy and Electronic files (A Micro station Macro for compiling Spanning Sheets and a 'Sample' Spanning Sheet can be provided if required).

11.2 PLS CAD Files - Hard copy and Electronic files

11.3 Co-ordinate List - Hard copy and Electronic files

The words 'AS BUILT' should be included in the title blocks and file names.

A2.2 TECHNICAL REQUIREMENTS

(132 – 15/3/2001)

Glossary

COW – Clerk of the works
CPE – Contracting Project Engineer
C Value – Ratio between conductor tension and mass used for catenary files
DT (IARC) - Distribution Technology/Industry association Resource Centre
CRA – Concept release approval
FSOW – Functional scope of Works Meeting
DRT/TEC – Design Review Team (formally Technical Evaluation Committee)
DRA – Definition release approval
ERA – Execution release approval
FRA – Finalisation release approval
FEM – Financial evaluation model
HV – High voltage effective range between 66kV – 132kV
Power office – Eskom tool for producing inter alia BOM's costing and associated
PLS Cadd/Pole/Tower - Eskom tool for producing Line designs and Tower modelling
PIC – Provincial Regional investment committee
SWER – MV technology which uses the ground as an electrical return circuit
SI – Technology and Quality
TSI – Technology Services International

1. Statutory requirements and standards.

• All activities shall comply with the statutory requirements and where possible, within the ambit of the relevant guidelines, inter alia.
• The Occupational Health and Safety Act 85 of 1993.

• The relevant standards and codes of practice, whether NRS, SABS or BS.

• The requirements of Eskom Standards applicable on the date of this brief. The standards are available through Distribution Technology.

• The Contracting Project Engineer is to take due cognisance of exemptions from the Act, as given by the Chief Inspector.

• **The contracting Project Engineer is responsible for the complete electrical design and installation of plant in terms of Clause 10 of the Occupational Health and Safety Act 85 of 1993.** The Contracting Project Engineer is to note that when drawings are submitted for approval, a principled approval on the proposed reticulation system and technology choice will be given, not on the details contained in the drawings. The Contracting Project Engineer will remain responsible for effective utilisation infrastructure to be installed and will be subject to post construction audits.

• It is required that a contracting Project Engineer should be formally appointed after the initial inspection and analysis report has been completed so as to determine the prospective scope and duration of a given project.

Notwithstanding the direct legal implication, the CPE will be accountable to the Eskom Project Engineer (specialist) in all issues relating to the engineering function.

2. Brief

• This brief sets out the principled design requirements for the project as detailed above.

• The CPE is to provide the relevant outputs as described below at the appropriate stage of the project taking due cognisance of all the technologies and requirements allowed for in the various standards, and where the standard technologies do not permit to provide the appropriate technological solution which shall be in accordance with the principles of the standards as well as the local specific requirements as set out in the sections below.

• In terms of the proposed consulting fee model, this project is divided into three distinct phases, viz. the pre-engineering phase, detail design phase and execution phase. Detailed requirements for Eskom approval of the initial two phases as well as the procedural requirements for the execution stages are set out below.

2.1 The pre engineering phase.

Where, after,
• The overall design requirements which were determined in the project scope and set out in this brief have been contemplated.

• The required project engineering team, technology and key stakeholder interventions have been completed.

• A preliminary detailed design strategy with specific requirements based on various models derived from the proposed project route has been completed –

• A design proposal which is considered most appropriate and will satisfy the requirements of the project scope will be offered to **Technical Evaluation Committee (TEC)** for approval. The requirements are as follows:

• A large-scale topographical drawing (1:20 000) of the project area showing the proposed routes and relevant key installation positions.

• A preliminary material requirement, which is to be based on a preliminary project assessment, is to be provided in accordance with the preliminary report and analysis. Critical components to be identified are to include conductor, insulator, pole/structure, or any other s special long lead-time items.

• Cost estimates based on an initial workable solutions for the most favourable structure type as well as the best alternative which will be derived from the parameter *seed files* imported into the most appropriate line design tool – PLS Cadd. The CPE is to ensure that the parameter seed files are appropriate and correct to the relevant structure family**. An Eskom surveyor will be included in the project engineering team. The Eskom surveyor will complete all PLS Cadd work including optimisation based on the standard design structures and seed files provided by the CPE. The CPE will remain accountable for the final optimised design including specialist structural work where applicable, this to be achieved by joint review with the Eskom surveyor.**

• A completed schedule of design criteria, where the relevant minimum requirements and settings are specified. Unspecified fields are to be completed where relevant. The required additional information, which is to be provided by the CPE, shows compliance with core criteria, highlights departures and provides for a summarised project description, which cross checks all the project information provided in the other submissions.

• A technical implementation proposal, which will provide the details of the specific techniques that are to be applied to the differing design requirements, contemplated in this project. Furthermore the technical feasibility shall be discussed with the relevant specialists before being offered.

• A schedule of the complete detailed design package in terms of contents and timing of control points, to be made available should the TEM approve the project. It is envisaged that this project will have a set of defined final design packages to allow for a phased implementation plan that will not compromise the accuracy of the final design packages, but will assist in reaching the implementation target date.

• The contracting Project Engineer is to ensure that the correct process is followed during the pre-engineering phase with specific reference to stakeholder inputs, pre TEC checks and TEC bookings. To this end a series of pre TEC discussion dates will be made available to monitor, check and advise as to project issues. **The Contracting Project Engineer shall canvass the relevant stakeholder so as allow for the provision of meaningful input with regard to these issues**. This should take place after the design brief and before the presentation to the **TEM**. In this regard it is mandatory for the routing form to be signed off **in sequence** by the relevant stakeholders so as to allow for the added information to serve as a basis for meaningful input by the following stakeholder. **Stakeholders may refuse discussion unless relevant information has been compiled. The relevant stakeholders are to be given at least one week's notice of intended discussions. Final TEM bookings will be dependant on the routing form being signed off in the correct sequence.**

• **Note: While the stakeholders input is considered important, the specific requirements are to be recorded on the standard form for the TEM to note. The CPE is obliged to weigh off the requirements from all the various imputs and proposed what is considered the most appropriate design, which is in keeping with the intention of the standards. The TEM shall have the final ruling on issues which require specific local implementation, which may appear to be contrary to the standards.**

2.2 Detailed design phase.

Where the design proposal as offered and accepted by the Technical Evaluation Committee (TEC) as well as the local and group CIC is implemented. The contracting Project Engineer (CPE) as a member Project Engineering team remains professionally accountable for the detailed outputs and final design package (FDP) implementation in terms of compliance with this brief and associated standards. In order to the achieve this, the relevant detailed project information as required in terms of the brief shall be compiled and provided at this time. Specific requirements and control points are as follows.

• Detailed design check, where the proposal and relevant design information described above is checked for compliance with the relevant detailed output requirements as well ensuring that the detailed designs are in keeping with the design proposals. Specific items, which are to be presented for checking, include.

• Detailed structure specifications and dimensioned drawings where applicable, this for the supplier/consortium to complete working drawings to be approved by the CPE.

• Detailed insulator specifications and technical evaluation reports and quantity schedules.

• The final pegging plan - From the optimising exercise, the CPE shall identify structure positions which may be difficult to place as well as other power and communication line crossings and shall ensure reasonable fit before providing the final optimised design. The CPE shall review the relative positions of the other lines which will be traversed and determine the appropriate 132 kV structure position or the movement of the affected line. Where applicable prospective line moves are to be quantified and included in the schedule of rates.

• Verified layout drawings/spanning sheets.

• The proposed single line diagrams indicating relevant structure numbering and labelling (existing and proposed where applicable).

• The relevant S & T charts.

• The package of structures to be made available for the contractor and clerks of work.

• A presentation of critical sections and crossing indicating the section of the overhead line profile, which will show compliance with the statutory requirements.

• The proposed implementation plan in terms of the revised prospective project implementation period, critical minimum line section construction modules and FDP references.

• An updated material and techniques schedule. The material supply chain and specification references are fundamental to this schedule.

• A complete Project engineering package which shall include inter alia, the latest amended, marked up, structure drawings, general layout, spanning sheets, S&T charts, preliminary single line diagram, implementation plan and material schedule that is intended for and which is referenced to this specific project shall be made available for the Eskom Clerk of Works and the Contractor. This package shall be presented for discussion with the Eskom project engineering specialist before issuing, furthermore the project shall not commence without the package being made available to the critical personnel.

2. 3 Execution phase.

During this phase the CPE is required to ensure that the project is completed in terms of the engineering requirements included in the final design package. While every effort is made to ensure all issues have been contemplated, it is required that the CPE should manage design changes as required by unforeseen situations in the context of the best long term solution, i.e. material shortages. In this regard , the mechanism for this is for the CPE to submit a deviation approval request form. Any departures from the requirements of this brief that require design approval shall be in writing as the contents of this brief will be the criteria against which the design issues will be audited.
Other reports, requirements and procedures are set out below.

• The pre commissioning check (including the SLD/commissioning process requirements) shall be completed by the CPE and a declaration signed by him stating clearly that, “The responsible Engineer and/or consulting firm responsible for the design shall warrant that the **“design”*** is fit for purpose and was constructed in accordance with the relevant standards and in terms of the brief and project engineering, final design package issued for the project.” In this regard, the said Engineer and/or firm shall indemnify Eskom against all liability, damages, expenses and/or loss which may incur as a result of the **“design”** not being fit for purpose In the event of an early upgrading, it will not be necessary for Eskom to prove the design was not fit for purpose but the onus shall be on the responsible Engineer and/or firm responsible for the design to prove that it was fit for purpose and/or that the early upgrading** was not unreasonable.

* Design in this context refers to the implied accountability in terms of the Engineering package and its implementation. **Upgrading in this context refers to premature repairs, retrofitting due to design inadequacies etc.

• Post commissioning report. A final design report shall be provided that will highlight deviations from the initial proposal as well as the final values obtained from the project. **A signed declaration shall be included in this report.**

3. Detailed electrical and structure design requirements.

With due consideration of the above phased design and execution stages, provide the complete electrical and structural design and feasible implementation plan so as to support the intended engineering solution which meets the requirements of the initiator, taking due cognisance of:

• The affected electrical system, the emerging masterplan for the specific local project area as well as the revised capacity requirements.

• The full range of technologies and requirements of the existing and emerging Distribution Standards. (The writer of the HV standard shall be consulted where required.)

• Where structures depicted in the Distribution standards do not meet the requirements of a particular project, and/or have an obvious error the CPE is to notify the Eskom Project Engineering specialist by way of a design change request or a non compliance report whichever is appropriate.
Furthermore an acceptable structure which complies with the requirements of the specific issues set out in this brief are to be offered to the Eskom project engineering specialist for approval before implementation. Note: A local standard structure/drawing should be considered before offering a new proposal.

• Drawing and survey requirements as specified by the Land development Department.

• Specific issues that would impact on the alternatives offered - i.e. scope, environmental, route selection and operational requirements that can be addressed within the ambit of the Distribution standards.

Specific requirements as given below.

3.1 Planning.

The CPE is to ensure that the system planning requirements in terms of, inter alia: electrical load and overload capability, conductor cross section and material type, where applicable, losses and reactive components are met. Furthermore where alternatives are considered, these should be discussed with the relevant system planner in order to provide for the most favourable final line design proposal.

3.2 Protection, metering and telecommunications.

In so far as it impacts on the specific scope and line design requirements:

• Verify the protection arrangement stated on the operating diagrams (SLD's) or substation operating diagrams.

• Liase with the Eskom protection, metering and telecommunications Telecom specialists in order to implement the optimal protection, metering and telecommunications telecom arrangement.

3.3 Earthing and soil bearing capability.

• The earthing requirements are set out in the Distribution Standard. Where required, the Contracting Project Engineer (CPE) will be responsible for ensuring that soil resistivity tests are carried out, and that the earthing design is completed and submitted in the relevant report.

• The CPE shall complete the necessary tests and/or obtain the soil samples for analysis so as to ensure that the specific requirements for stays, foundations and erosion mitigation can be included in the design where required.

3.4 Equipment and structures

The Contracting Project Engineer is to ensure that:

• Structure parameters are correct and appropriate to the Standard requirements as revised at the detailed design time implementation. These to include, standard structure and conductor attachment heights, electrical spacing criteria including insulator dimension requirements – to be included in the insulator specification, maximum wind, weight and uplift criteria as well as maximum allowable swing angles.

• Structures are uncluttered with regard to the amount of equipment installed and shall ensure that provision is made for safe and easy operational practice. Furthermore, the design shall allow for all operational eventualities and shall include features, which will allow for climbing, tensioning and lifting.

• Live line work is to be included in the structure design in the context of the route and other considerations.

• Structures are designed to withstand the mechanical forces that would be set up due to transient surges and power frequency fault conditions.

• **Correct stringing, sag and tension techniques are to be specified and used.**

• Crimping components, tools, dies and the associated accreditation requirements are well defined.

• Consideration shall be given to the provision of a generic emergency structure to be available at a central point so as to obviate any lengthy outage in the event of an emergency.

3.5 Associated projects and linked disciplines

The Contracting Project Engineer is to ensure that:

• He is familiar with all associated projects, which may impact on this project, furthermore, where areas of conflict and /or ambiguity are found / anticipated, these shall be discussed and a clear path of action defined with the relevant stakeholders.

• In terms of the above, issues relating to closing spans and line orientation shall be determined in the final design package.

• All agreements in this regard shall be signed by the relevant project engineers and shall be discussed with the project co-ordinator who shall keep a record of such agreements.

3.6 Route selection optimising and environmental.

The Contracting Project Engineer is work in conjunction with the nominated surveyor and environmentalist who are to provide the prospective route as well as environmental reports. The CPE is to ensure that where appropriate the requirements of the environmental reports to be included in the structure, bird mitigation and implementation specifications. Where the nominated surveyor indicated will complete the line optimising and pegging, the CPE will remain responsible for reviewing and approving the final solution as well as compiling the final as pegged BOM/schedule of structures.

7 Materials

• Material options will be as determined in the standard design packages (seed files). Where specific site circumstances or technology changes that are ahead of the commercial processes require non-standard material applications and/or due to short comings of the standard packages, the Contracting Project Engineer shall develop “ad Hoc” packages and submit these to Eskom design section for approval before implementation. The components within the design packages are to be in compliance with the Eskom specification, however should the specification not be available, then DT approval will be required.

• The Contracting Project Engineer is to ensure that the materials required for the proposed project are available, if not, a design strategy should be applied to allow for alternatives. Furthermore where standard items are contemplated which do not have an ENC or where specific requirements exist; the relevant specifications shall be attached and referenced to the BOM. Due cognizance of lead times is important, thus, it is required that where items are identified that will impact on the project schedule, a preliminary BOM containing these items and/or specifications are to be forwarded to the project manager/co-ordinator after consultation with the Eskom PE.

• Structures – The CPE is to specify standard structures in conjunction with options available in HV standard. Structure parameters are to be derived from DT but are to be checked by the CPE and where changes are required to be regulated and recorded.

• Insulators – The CPE is to specify insulators, which are in accordance with relevant national specifications and are appropriate to the structure design and parameter requirements – this includes electrical separation and tip load requirements. Provision shall be made for insulator compliance reviews with KIPTS.

• Wood poles (55 M Pa.) are to be correctly rated to loads required, with the emphasis on appropriate and efficient usage. The CPE is to take cognizance of the detailed specification requirements relating to wood poles, especially the quality inspection and marking process.

8 Requirements in terms of procedures and reports.

8.1 Bill of packages, estimated costs and indicators:

• Bills of materials and costs shall be derived from the relevant design tool PLS Cadd* using the specific seed files for the various components as a reference. In order to verify the most cost effective solution, realistic material and labour prices are to be included in the seed files. The CPE is to ensure that the DRA is completed correctly so as to allow for a trouble free passage to the PIC. In terms of the BOM. This shall be produced in a format acceptable to the project manager. The CPE shall check the BOM for accuracy and report discrepancies to the Eskom project engineering specialist as well as the project manager. Where appropriate, the contracting Project Engineer shall liase directly with the Project Services section.

***Subject to parameter files having been completed by the relevant technical committee.**

8.2 Approvals

• The contracting project engineer shall obtain the statutory approvals for the construction of this project on behalf of ESKOM from the Authorities concerned. **These approvals include the relevant environmental approvals.**

• Cognizance of the impact that the line route will have on fences and the requirements for gates as well as the gate specification should be included in the design specification and is to be discussed with the relevant surveyor who will be responsible for negotiating servitudes.

8.3 Design criteria - design schedule

• A basic schedule providing relevant information required for project orientation and definition is included. The contracting project engineer shall check the existing information, effect change where necessary and add information obtained from the relevant stakeholder in so much as it will have an effect on the design component.

8.4 Accuracy

• The network layout must be based on both cadastral information and existing site conditions. The structure types and especially pole lengths indicated must also suit these conditions.

8.5 Site meeting

• Site meetings will be co-ordinated by the contracting project engineer and the project co-ordinator.

8.6 Design change requests. (Deviation approvals)

• Where non Eskom standard techniques or material types in force at the time of the brief are being proposed, written application with detailed calculations and/or test certificates to support the request (where applicable), must be forwarded to the Eskom project engineer for approval, thereafter written approval for specific project implementation will be granted or denied. These requests will only be considered if submitted on the standard request form. A copy of this approval must be forwarded to the project leader or delegated COW for written acceptance before becoming effective.

• In terms of design specifications, interpretations and instructions, there are only two documents, which apply the contents of the final design package and/or an approved deviation approval. It is required that the contractor should be aware of the relevant standards and revisions, and shall be obliged to raise questions to the CPE through the COW regarding apparent differences between the FDP and the relevant standard, this to be recorded in the site diary. Notwithstanding this, the requirement of the FDP and/or deviation approval shall serve as the reference for project implementation. While verbal discussion may pre empt deviation approvals, only written approvals are to be effected.

8.7 Materials, procedures and design report form.

• Where issues that need design corrective measures are encountered, the above form shall be forwarded to the Project Engineer. It may be required that where latent faults or issues relating to poor design or workmanship are encountered by field staff, the contracting Project Engineer will be required to respond to such a report with corrective action proposals.

8.8 Site visits and site instructions

• The project engineering function will have automatic right to site visits, however, all requirements will be forwarded to the CPE except where obvious irregularities which may impact on safety are concerned. A site book will be signed if available.

8.9 Single Line Diagram

Single line diagrams shall be configured, verified and provided to the “Network control” section in accordance with the single line diagram management process.

In terms of this process, the CPE is directly responsible for the correct SLD being implemented.

8.10 Final report.

• Detailed requirements to be included in the final report are, inter alia;

• Final line schedule with information is to be provided in terms of - Structure placement, number, type, soil nomination, foundation type, earth resistivity, equivelent span, stringing tension and temperature, special mitigation/notes.

• A schedule which shows the as built structure drawing reference numbers as well as the final revision numbers. Furthermore the schedule shall provide for the signing off of the received drawings by the Eskom recipient.

• A schedule providing details relating to additional earth installations

• A schedule which shall provide details relating to the installation of power driven stays, viz. Project name, power stay contractors details, quantity of stays successfully installed per category with relevant details, also details of installations where power stays were not successful.

• Copies of the approved design changes applicable to this project.

• The signed declaration by the responsible engineer who shall verify that the plant has been installed in accordance with the requirements of this brief and required specifications and standards by virtue of a personal site check.

8.11 Project reference

All correspondence with the Eskom Design Project Engineer relating to the scope of this brief in so much as it affects a given line module shall have a specific reference.
Where deviations are requested the engineering reference shall be provided. The engineering reference specific to these projects will be agreed between the CPE and the Eskom PE specialist.

8.12 Report format

All project engineering reports shall be made available in hard copy as well as electronic format.

I …….. appointed as CPE for the above project understand and accept the requirements set out in the above brief.

Signed:

Date:

A3 New Medium Voltage Lines

*22 – 13/7/2000

TECHNICAL REQUIREMENTS

Glossary

COW – Clerk of the works
CPE – Contracting Project Engineer
C Value – Ratio between conductor tension and mass used for catenary files
DT (IARC) - Distribution Technology/Industry association Resource Centre
FSOW – Functional scope of Works Meeting
DRT/TEC – Design Review Team (formally Technical Evaluation Committee)
CRA – Concept release approval
DRA– Definition release approval
ERA – Execution release approval
FRA – Finalisation release approval
FEM – Financial evaluation model
IV – Intermediate voltage 1000-3300 V
LV – Low voltage effective range between 50 – 1000 V
MV – Medium voltage effective range between 1000 – 33000V
Power office – Eskom tool for producing inter alia BOM's costing and associated
RIC – Regional investment committee
SWER – MV technology which uses the ground as an electrical return circuit
SI – Technology and Quality
TSI – Technology Services International

1. Statutory requirements and standards.

• All activities shall comply with the statutory requirements and where possible, within the ambit of the relevant guidelines, inter alia.

• The Occupational Health and Safety Act 85 of 1993. (Current Revision)

• The relevant standards and codes of practice, whether NRS, SABS or BS.

• The requirements of Eskom Standards applicable on the date of this brief. The standards are available through Distribution Technology.

• The Contracting Project Engineer is to take due cognisance of exemptions from the Act, as given by the Chief Inspector.

• The contracting Project Engineer is responsible for the complete electrical design and installation of plant in terms of Clause 10 of the Occupational Health and Safety Act 85 of 1993.

The Contracting Project Engineer is to note that when drawings are submitted for approval, a principled approval on the proposed reticulation system and technology choice will be given, not on the details contained in the drawings. The Contracting Project Engineer will remain responsible for effective utilisation infrastructure to be installed and will be subject to post construction audits.

• It is required that a contracting Project Engineer should be formally appointed after the initial inspection and analysis report has been completed so as to determine the prospective scope and duration of a given project. He will be accountable to the Eskom Project Engineer (specialist) in all issues relating to the engineering function.

2. Brief

• This brief sets out the principled design requirements for the above project, with specific reference to the initiators requirements which are set out on the attached Form 10.

• The CPE is to provide the relevant outputs as described below at the appropriate stage of the project taking due cognisance of all the technologies and requirements allowed for in the various standards, and where the standard technologies do not permit to provide the appropriate technological solution which shall be in accordance with the principles of the standards as well as the local specific requirements as set out in the sections below.

• In line with the project engineering process and the form of agreement for consulting services for electrification projects with specific local output requirements, **the project is divided into two distinct phases, viz.**

2.1 The pre engineering phase.

• Where the overall design requirements as set out in this brief are contemplated and a preliminary detailed design strategy with specific requirements based on the proposed route, profiles and preliminary optimising and where applicable the representative sample models derived from the proposed project area will be offered to **Technical Evaluation Meeting (TEM)** for approval. The requirements are as follows:

• The relevant response to:

• The specification and findings schedule – (PE).

• The functional requirements specific to this project, viz.. Planning, Protection, Survey, Plant and field services in terms of,

• Representative samples from the route profile, structure choice, optimisation and spanning sheets.

• The preliminary single line diagram, showing details of the MV voltage, protection, metering, MV conductor size, insulation values, structure and hardware condition, line configuration and transformer installations.

• A large-scale topographical drawing (1:20 000) of the project area showing the MV routes and relevant transformer positions.

• Where required detailed design of representative transformer area/s showing transformer, protection, conductor and service details together with the relevant DT volt drop (Retic lite) files for initial and pre upgrade values. Resultant transformer, conductor and service loss values are to be summated for the various load values and included in the schedule of findings. The study reports required for the TEC presentation include; Draw input, Draw output and Voltage profile.

• A preliminary schedule of activities based on design codes. Where required due to the specific project schedule, a material requirement, which is to be based on this preliminary project assessment, is to be provided in accordance with the preliminary report and analysis. Critical components to be identified are to include conductor, insulator, pole, transformers as well as special long lead-time items i.e. reclosers.

• A cost estimate based on standard line costs and components – refer pro forma TEM costing sheet.

• A completed schedule of design criteria, where the relevant minimum requirements and settings are specified. Unspecified fields are to be completed where relevant. The required additional information, which is to be provided by the CPE, shows compliance with core criteria, highlights departures and provides for a summarised project description, which cross checks all the project information provided in the other submissions.

• A technical implementation proposal, which will provide the details of the specific techniques that are to be applied to the differing design requirements, contemplated in this project. Furthermore the technical feasibility shall be discussed with the relevant specialists before being offered.

• A schedule of the complete detailed design package in terms of contents and timing of control points, to be made available should the TEM approve the project.

• The contracting Project Engineer is to ensure that the correct process is followed during the pre-engineering phase with specific reference to stakeholder inputs, pre TEM checks and TEM bookings. To this end a series of pre TEM discussion dates will be made available to monitor, check and advise as to project issues.

2.2 Operational stage.

Where the design proposal as offered and accepted by the Technical Evaluation Meeting (TEM) is implemented. (At this stage the contracting Project Engineer (CPE) is considered to be an extension of the Project Engineering section and fully accountable in terms of compliance with this brief and associated standards.) In order to the achieve this, the relevant detailed project information as required in terms of the brief shall be compiled and provided at this time. Specific requirements and control points are as follows.

• Detailed design check, where the proposal and relevant design information described above is checked for compliance with the relevant detailed output requirements as well ensuring that the detailed designs are in keeping with the design proposals. Specific items, which are to be presented for checking, include.

• The final as pegged and verified layout drawings/spanning sheets.

• The proposed single line diagrams indicating relevant structure numbering and labelling (existing and proposed where applicable).

• The relevant S & T charts.

• The package of structures to be made available for the contractor and clerks of work.

• A sample section of the overhead line profile, which will show the templating technique. The sample is to be representative of the technique to be applied to the project.

• The proposed implementation plan in terms of the revised prospective project implementation period, critical minimum line section modules as well as the resource and outage time requirements per module. Factors, which impact on number and duration of outages, are to be included.

• An updated material and techniques schedule, the material supply chain and specification references are fundamental to this schedule.

• A complete Project engineering package which shall include inter alia, the latest amended, marked up, structure drawings, general layout, spanning sheets, S&T charts, preliminary single line diagram, implementation plan and material schedule that is intended for and which is

referenced to this specific project shall be made available for the Eskom Clerk of Works and the Contractor. This package shall be presented for discussion with the Eskom project engineering specialist before issuing, furthermore the project shall not commence without the package being made available to the critical personnel.

• Management of design changes as required by unforeseen situations, i.e. material shortages. The mechanism for this is design change request form. Any departures from the requirements of this brief that require design approval shall be in writing as the contents of this brief will be the criteria against which the design issues will be audited.

• The pre commissioning check (including the SLD process requirements) shall be completed by the consulting project engineer and a declaration signed by him stating clearly that, "The responsible Engineer and/or consulting firm responsible for the design shall warrant that the **"design"*** is fit for purpose and was constructed in accordance with the relevant standards and in terms of the brief and project engineering package issued for the project."
In this regard, the said Engineer and/or firm shall indemnify Eskom against all liability, damages, expenses and/or loss which may incur as a result of the **"design"** not being fit for purpose
In the event of an early upgrading, it will not be necessary for Eskom to prove the design was not fit for purpose but the onus shall be on the responsible Engineer and/or firm responsible for the design to prove that it was fit for purpose and/or that the early upgrading** was not unreasonable.
* Design in this context refers to the implied accountability in terms of the Engineering package and its implementation. **Upgrading in this context refers to premature repairs, retrofitting due to design inadequacies etc.

• Post commissioning report. A final design report shall be provided that will highlight deviations from the initial proposal as well as the final values obtained from the project. **A signed declaration shall be included in this report.** With due consideration of the above phased design and execution stages, provide the complete electrical, structural design and feasible implementation plan so as to support the intended engineering solution, the intention of which was determined by the initiator, taking due cognisance of:

• The affected electrical system, the emerging masterplan for the specific local project area as well as the revised capacity requirements.

• The full range of technologies and requirements of the Distribution Standards.

• Where structures depicted in the Distribution standards do not meet the requirements of a particular project, and/or have an obvious error the CPE is to notify the Eskom Project Engineer by way of a design change request or a non-compliance report whichever is appropriate.
Furthermore an acceptable structure which complies with the requirements of the specific issues set out in this brief are to be offered to the Eskom project engineer for approval before implementation. Note: A local standard structure/drawing should be considered before offering a new proposal.

• Drawing and survey requirements as specified by the Survey Department.

• Specific issues that would impact on the alternatives offered - i.e. scope, environmental, route selection and operational requirements that can be addressed within the ambit of the Distribution standards. **The Contracting Project Engineer shall canvass the relevant stakeholder so as allow for the provision of meaningful input with regard to these issues**. This should take place after the design brief and before the presentation to the **TEM.** In this regard it is mandatory for the routing form to be signed off in sequence by the relevant stakeholders so as to allow for the added information to serve as a basis for meaningful input by the following stakeholder. **Stakeholders may refuse discussion unless relevant information has been compiled. The relevant stakeholders are to be given at least one week's notice of intended discussions. Final TEM bookings will be dependant on the routing form being signed off in the correct sequence.**

• **Note: While the stakeholders input are considered important, the specific requirements are to be recorded on the standard form for the TEM to note. The CPE is obliged to weigh off the requirements from all the various imputs and proposed what is considered the most appropriate design, which is in keeping with the intention of the standards. The TEM shall have the final ruling on issues which require specific local implementation, which may appear to be contrary to the standards**.

• Specific requirements as given below.

3. Detailed electrical design.

3.1 Planning.

The CPE is to ensure that the system planning requirements in terms of, inter alia: electrical load and overload capability, conductor cross section and material type, losses and reactive components, are met. Furthermore where alternatives are considered, these should be discussed with the relevant system planner in order to provide for the most favourable final line design proposal.

3.2 Protection, metering and telecommunications.

In so far as it impacts on the specific scope and line design requirements:

• Verify the protection arrangement stated on the operating diagrams (SLD's)

• Liase with the Eskom protection, metering and telecommunications Telecom specialists in order to implement the optimal protection, metering and telecommunications telecom arrangement.

• 3.3 Soils and soil resistivity.

• The earthing requirements are as per the Distribution Standard. Where required, the Contracting Project Engineer will be responsible for ensuring that soil resistivity tests are carried out, and that the earthing design is completed and submitted in the relevant report.

• Where structures are dependant on minimum bearing pressures, the critical areas are to be surveyed and/or samples gathered for analysis and where applicable augmentation.

3.4 Equipment and structures

The Contracting Project Engineer is to ensure that:

• Structures are uncluttered with regard to the amount of equipment installed and shall ensure that provision is made for safe and easy operational practice.

• Structures are designed to withstand the mechanical forces that would be set up due to transient surges and power frequency fault conditions.

• **Correct stringing, sag and tension techniques are to be specified and used.**

• Crimping components, tools, dies and the associated accreditation requirements are well defined.

4. Materials

4.1 Specific requirements relating to Materials, Techniques and Standards.

• Except for allowances made below, all designs offered shall comply with the detailed requirements the Eskom Distribution Standards as amended on the date of invitation to tender. With specific reference to

materials offered, all materials must be new, of the best quality and shall conform to the requirements of the Eskom Buyers Guide (Eskom Distribution Standard Part 9).

• A preferred manufacturers schedule has been included in the annexures. It is required that prospective contractors should use this schedule in order to procure the various components to be used on this project. In the event that the prospective contractor intends to procure items from manufacturer/s, which do not appear on the schedule, the contractor shall provide test certificates which, shall have been approved by DT in terms of the process set out below.

• Material options will be as determined in the standard design packages**. The standard design codes applicable to the Eastern Cape Operating Unit are to be used as a reference**. Where specific site circumstances or technology changes which are ahead of the commercial processes require non-standard material applications and/or due to shortcomings of the standard packages, the CPE shall develop "ad Hoc" packages and submit these to the PES for approval before implementation. The components within the design packages are to be in compliance with the Eskom specification, however should the specification not be available, then DT approval will be required, for the specification reference, the test facility or both. The CPE is to ensure that the design material requirements are available, if not, a design strategy should be applied to allow for alternatives. **Where the BOM and or the design scope changes to require additional materials via logistics, a deviation approval request, providing the causes as well as the costs of the change shall be forwarded to the PES for approval before implementation. This serves as a control mechanism to check design applications, as well as BOM accuracy related to design codes/packages/CIP/SAP.**

4.2 Distribution transformers to be considered:

Primary	kVA	Configuration	Approved manufacturer	Specification
22&11	100 &50	Three phase	DT approval	SABS 780
22,19 &11	32	Dual phase	DT approval - 19	SABS 780
			kV - SWER -type tests required	
22, 19 &11	16	Single phase	DT approval - 19 kV - SWER –type tests	SABS 780

• Where transformers are of the non-CSP type, the Area project engineer shall allow for reasonable operational requirements and transformer protection. Fuse element ratings are to be determined by the Area project engineer and shall be in accordance with the LV protection policy.

• Wood poles (55 Mpa.) are to be correctly rated to loads required, with the emphasis appropriate efficient usage. Single pole structures which are to support transformers rated at 100 kVA or larger, are to have a minimum pole top diameter of 200 mm.

5 Requirements in terms of procedures and reports.

5.1 Bill of packages, estimated costs and indicators:

• Should the materials be externally sourced, then a schedule of structures and activities with the relevant buyers guide (part 9) and preferred manufacturer's schedule shall be provided in the FDP.

• Should the equipment be sourced through Eskom. A BOM based on the DT design codes shall be obtained through the project services'- DT project and CIP programs. The CPE is to ensure that the correct design codes and quantities have been entered. Also where unique structures require manipulation of the package, these shall be thoroughly checked before upload.

• The Eastern Cape Operating Unit design codes are to be used as a reference.

5.2 Single Line Diagrams

• Single line diagrams shall be configured, verified and provided to the “Reni” section in accordance with the single line diagram management process. In terms of this process, project engineering is functionally accountable and the CPE is directly responsible for the correct transformer names and SLD being implemented. The CPE shall interface directly with “Reni” in this regard, furthermore he shall confirm allocated transformer names prior to compiling SLD’s.

5.3 Full compliance with the Cape Coastal Cluster standards;

• **SRDOC001** – Transformer names. The Area project engineer is to allocate consumer identification labels in accordance with the above local standard, transformer supply zones are to be shown, and

• **SRCOC002** – Distribution line prefixes and numbering of lines, are required.

5.4 Approvals.

• The CPE shall ensure that (Eskom) Land development have obtained the statutory approvals for the construction of this project on behalf of ESKOM from the Authorities concerned. This is especially pertinent to Eskom services traversing privately owned land as well as SWER extensions. **These approvals include the relevant environmental approvals.**

• Cognizance of the impact that the line route will have on fences and the requirements for gates as well as the gate specification should be included in the design specification and is to be discussed with the relevant surveyor who will be responsible for negotiating servitudes.

• A basic schedule providing relevant information required for project orientation and definition is included. The contracting project engineer shall check the existing information, effect change where necessary and add information obtained from the relevant stakeholder in so much as it will have an effect on the design component.

5.5 Specification and findings schedule

• A basic schedule providing relevant information required for project orientation and definition may be included. The Area project engineer shall check the existing information, effect change where necessary and add information obtained from the relevant stakeholder in so much as it will have an effect on the design component.

5.6 Design change requests. (Deviation approvals)

• Where non Eskom standard techniques or material types in force at the time of the brief are being proposed, written application with detailed calculations and/or test certificates to support the request (where applicable), must be forwarded to the **Eskom Project Engineering Specialist** for approval, thereafter written approval for specific project implementation will be granted or denied. These requests will only be considered if submitted on the standard request form. A copy of this approval must be forwarded to the project leader or delegated COW for written acceptance before becoming effective.

• In terms of design specifications, interpretations and instructions, there are only two documents, which apply the contents of the final design package and/or an approved deviation approval. It is required that the contractor should be aware of the relevant standards and revisions, and shall be

obliged to raise questions to the CPE through the COW regarding apparent differences between the FDP and the relevant standard, this to be recorded in the site diary. Notwithstanding this, the requirement of the FDP and/or deviation approval shall serve as the reference for project implementation. While verbal discussion may pre empt deviation approvals, only written approvals are to be effected.

• Not withstanding the above, where changes are required due to incorrect initial final design package requirements, changes in the scope, or on site structure position changes which will affect the BOM included in the FDP, a deviation approval shall be submitted for approval with the PES before additional materials can be procured.

5.7 Pole inspection reports.

Where indicated on the basis of preliminary reports, the CPE is to initiate a pole inspection /treatment contract through the project co-ordinator before the project proposal can be formulated. The CPE is to include the following principles in the contract;
Minimum cost for P&G's by avoiding two sets of site establishment Preliminary sampling reports and assessment to determine if the full inspection is warranted (the option to curtail the inspection after a pre-determined sample).

5.8 Asset to be decommissioned report (Finance).

The pro forma dismantling form shall be completed and included as an attachment with the DRA.

5.9 Materials, procedures and design report form.

• Where issues that need design corrective measures are encountered, the above form shall be forwarded to the Project Engineer. It may be required that where latent faults or issues relating to poor design or workmanship are encountered by field staff, the Area project engineer will be required to respond to such a report with corrective action proposals.

5.10 Site visits and site instructions

• The project engineering function will have automatic right to site visits, however, all requirements will be forwarded to the Area project engineer except where obvious irregularities which may impact on safety are concerned. A site book will be signed if available.

5.11 Schedule of Drawings Required.

• The single line diagram of the MV reticulation including proF10tion and metering symbols.

• The MV layout of the whole project is to be shown on one drawing appropriately scaled.

• Not withstanding the above, where applicable, drawings to a suitable scale as follows:

• A drawing showing, the proposed MV and LV reticulation, structure activity codes and numbered transformer positions are required.

• Above drawings as a base level with additional individual levels to indicate,

• Customer Connections and alt ID's

• A set of A4 drawings per project area, each drawing showing the affected individual transformer area as well as the coded low voltage reticulation emanating from the transformer. These drawings are to represent the "as built" condition at the time of handover, are to be bound into a booklet and handed to the relevant TSO.

5.12 Final report.

Detailed requirements to be included in the final report are, inter alia;

• Final single line diagram, information is to be provided in terms of the pre engineering requirements, viz. protection, metering, system configuration and prefixes.

• Revised bench mark indicators for the project, showing deviations from the CRA proposal.

• A schedule which shows the as built drawing reference numbers as well as the final revision numbers furthermore the schedule shall provide for the signing off of the received drawings by the Eskom recipient.

• A schedule which shall provide details of the energy balancing metering ations, viz. Project name, Transformer/Auxiliary No., Eskom No., and commissioning date of meter.

• A schedule providing details of the file names of the electronic volt drop and loss files.

• A schedule providing details relating to the earth installations, viz, project name, Transformer/auxiliary No. and final earth value attained.

• A schedule of poles used on the project - Refer PE bulletin October 2000.

• A schedule which shall provide details relating to the installation of power driven stays, viz. Project name, power stay contractors details, quantity of stays successfully installed per category with relevant details, also details of installations where power stays were not successful.

• Copies of the approved design changes applicable to this project.

• The signed declaration by the responsible engineer who shall verify that the plant has been installed in accordance with the requirements of this brief and required specifications and standards by virtue of a personal site check.

5.13 Project reference

• All correspondence with the Eskom Design Project Engineer relating to the scope of this brief in so much as it affects a given transformer zone shall have a specific reference. Where deviations are requested a separate deviation request per transformer zone together with the engineering reference shall be provided.

5.14 Report format

All project-engineering reports shall be made available in hard copy as well as electronic format.

I …….. appointed as CPE for the above project understand and accept the requirements set out in the above brief.

Signed:

Date:

A4 Line Refurbishment

*Refurb May 2006

Glossary

COW – Clerk of the works
CPE – Contracting Project Engineer
C Value – Ratio between conductor tension and mass used for catenary files
DT (IARC) - Distribution Technology/Industry association Resource Centre
CRA – Concept release approval
FSOW – Functional scope of Works Meeting
DRT/TEC – Design Review Team (formally Technical Evaluation Committee)
DRA – Definition release approval
ERA – Execution release approval
FRA – Finalisation release approval
FEM – Financial evaluation model
IV – Intermediate voltage 1000-3300 V
LV – Low voltage effective range between 50 – 1000 V
MV – Medium voltage effective range between 1000 – 33000V
Power office – Eskom tool for producing inter alia BOM's costing and associated
RIC – Regional investment committee
SWER – MV technology which uses the ground as an electrical return circuit
T&Q – Technology and Quality
TSI – Technology Services International

1 Statutory requirements and standards.

• All activities shall comply with the statutory requirements and where possible, within the ambit of the relevant guidelines, inter alia.

• The Occupational Health and Safety Act 85 of 1993.

• The relevant standards and codes of practice, whether NRS, SABS or BS.

• The requirements of Eskom Standards applicable on the date of this brief. The standards are available through Distribution Technology.

• The Contracting Project Engineer is to take due cognisance of exemptions from the Act, as given by the Chief Inspector.

• **The contracting Project Engineer is responsible for the complete electrical design and installation of plant in terms of Clause 10 of the Occupational Health and Safety Act 85 of 1993.** The Contracting Project Engineer is to note that when drawings are submitted for approval, a principled approval on the proposed reticulation system and technology choice will be given, not on the details contained in the drawings. The Contracting Project Engineer will remain responsible for effective utilisation infrastructure to be installed and will be subject to post construction audits.

• It is required that a contracting Project Engineer **(CPE)** should be formally appointed after the initial inspection and analysis report has been completed so as to determine the prospective scope and duration of a given project. He will be accountable to the Eskom Project Engineer (specialist) in all issues relating to the engineering function.

2 Brief

• This brief sets out the principled project engineering and design requirements for the above project.

• The CPE is to provide the relevant outputs as described below, at the appropriate stage of the project taking due cognisance of all the technologies allowed for in the various standards. Where the standard technologies do not permit to provide the appropriate technological solution which shall be in accordance with the principles of the standards as well as the local specific requirements as set out in the sections below.

• Within the bounds of the project engineering process and the form of agreement for consulting services with specific regional output requirements, **the project is divided into two distinct phases, viz.**

2.1 The pre engineering phase (CRA).

Technical evaluation.
Where the overall design requirements as set out in this brief are contemplated and a preliminary detailed design strategy with specific requirements based on representative sample models derived from the proposed project area will be offered to **Technical Evaluation Committee (TEC)** for technical approval. The requirements are as follows:

• Response to the generic requirements (Appendix 1), viz. Spanning sheets, protection, metering, conductor size, insulation values, structure and hardware condition and line configuration. In this regard the CPE shall make suitable and adequate arrangements for competent and accredited contractors to complete pole condition surveys, line component and hardware condition assessments, furthermore, a section of conductor of at least 20 meters shall be removed from the line and shall be tested by TSI.

• Topographical drawings (to suitable scale) which shall include complete the project area and the closest town for reference showing the line routes and relevant natural and man made features.

• A preliminary material requirement, based on a preliminary project assessment, is to be provided in accordance with the preliminary report and analysis. Critical components to be identified include; conductor, insulator, pole as well as special long lead-time items.

• A cost estimate based on

• Standard line component costs – Refurbishment component and/or cost outputs from Power office or recent similar project rates.

• Where it is not practicable to obtain prospective line route profiles, recent equivalent line costs are to be used as a reference for estimating.

• The completed schedule: Refurbishment criteria, where the relevant minimum requirements and settings are specified. Unspecified fields are to be completed where relevant. The required additional information, which is to be provided by the CPE, shall show compliance with core criteria, highlight departures and provide for a summarised project description, which shall be congruent with all the project information provided in the other submissions.

• A technical implementation proposal, which will provide the details of the specific techniques that are to be applied to the differing refurbishment requirements, contemplated in this project. Furthermore the technical feasibility shall be discussed with the relevant specialists before being offered.

• A schedule of anticipated outage requirements related to the proposed upgrade project. The schedule shall be based on the implementation proposal and shall provide details of inter alia; the prospective project implementation period, the affected minimum section of line/s, number and duration of outages required also the flexibility of outage times. Live line options are to be considered in this regard.

• A schedule of the complete detailed design package in terms of contents and timing of control points, to be made available should the TEC approve the project.

• The contracting Project Engineer is to ensure that the correct process is followed during the pre-engineering phase with specific reference to stakeholder inputs, pre TEC checks and TEC bookings. To this end a series of pre TEC discussion dates will be made available to monitor, check and advise as to project issues. Where the design proposal as offered and accepted by the Technical Evaluation Committee, the DRA is prepared for presentation to the Regional Investment Committee (RIC) for approval, and if successful, is implemented.

2.2 Financial evaluation.

Requirements for the preparation of the DRA and the RIC presentation.

The CPE shall calculate all costs associated with the project and shall compile the
DRA so as to meet the deadline for the scheduled RIC. The CPE may be required to present and/or explain the DRA at the RIC.
The DRA shall include the following sub components.

• Asset to be decommissioned report (Finance).

• The pro forma dismantling form shall be completed and included as an attachment with the DRA.

• The FEM if economic* and/or the revised CBA if strategic*. **The most current FEM is to be used.**
*Project categorisation. The correct details including costs, dismantling, scheduled project dates, financial indicators, overheads, IDC and long lead time items are to be included on the DRA.
A power point presentation derived from a pro forma shall be prepared for presentation to the RIC.

2.3 Execution phase – (ERA).

The Contracting Project Engineer (CPE) remains fully accountable in terms of compliance with this brief and associated standards, viz. The correct technical engineering package for the project as well as reasonable interventions to ensure correct application of the package.
This phase extends form the DRA approval to project closes out and includes the following key milestones.

2.4 Compilation and handover of the final design package (FDP).

• Compile the relevant detailed project information as required in terms of the brief shall be compiled and provided in the form of a final design package (FDP) at the required time in the process. Specific requirements and control points are as follows.

• Detailed design check, where the proposal and relevant design information described above is checked for compliance with the relevant output requirements as well ensuring that the detailed designs are in keeping with the design proposals. Specific items, which are to be presented for checking, include.

• The final as pegged and verified layout drawings/spanning sheets.

• The relevant S & T charts.

- The package of structures to be made available for the contractor and clerks of work.
- Relevant sections of the overhead line profile, which will show clearances to relevant features.

- The proposed implementation plan in terms of the revised prospective project implementation period, critical minimum line section modules as well as the resource and outage time requirements per module. Factors, which impact on number and duration of outages, are to be included.

- An updated material and techniques schedule, the material supply chain and specification references are fundamental to this schedule.

- Detailed phase balancing requirements derived from the planning/plant function.

2.5 In summary

A complete Project engineering package which shall include inter alia, the latest amended, marked up, structure drawings, general layout, spanning sheets, S&T charts, preliminary single line diagram, implementation plan and material schedule that is intended for and which is referenced to this specific project shall be made available for the Eskom Clerk of Works and the Contractor. This package shall be presented for discussion with the Eskom project engineering specialist (PES) before issuing, furthermore the project shall not commence without the package being made available to the critical personnel. It is important to note that the CPE remains fully responsible and accountable for all aspects of the FDP. The reviewing process is to ensure that the salient components are included in the package as well as to identify obvious errors and omissions, this by using a pro forma check sheet.

2.6 Completion of tender documents or internal construction contract.

Where required by the project services and commercial departments. Further technical support is to be provided where specific sub contracts and material tenders form part of the project and require technical evaluation. The CPE will be invited to attend a Squad check to ensure all issues and documents have been included in the tender compilation.

2.7 Approval of the ERA.

On the basis of the contract values, the project will be presented to the RIC for approval. Where the costs or scope has changed significantly, the CPE may be called to account for these where applicable, furthermore this may cause the DRA
to be revised and re presented to the RIC.

2.8 Project construction -

Sample installation
Where required to illustrate specific techniques etc., a sample installation is required for the project. This sample installation shall include the tendered commodities and construction techniques applicable to the project and shall be built at a central point during site establishment and shall be approved before construction commences. The CPE shall give the Eskom project engineer two weeks notice for this installation to be checked, a date will then be agreed between the parties. In the event of Eskom members rationalising area visits, this will be communicated and in order not to cause project delays the following principles will apply.

The CPE is to give interim approval for the sample installation after he is satisfied that the sample installation meets the following criteria; Requirements of the buyers guide. Requirements of the relevant standards and the detailed design package including deviation approvals.

2.9 Requirements of relevant Design bulletins.

Materials derived from suppliers who are listed on the Eastern Cape Operating Unitpreferred manufacturers schedule are to be checked on site – a sample board shall be made up from

approved components derived from the site stores. A date will be agreed for a member of design to review the sample installations together with the contracting Project Engineer so as to ensure compliance with the relevant design requirements in force as set out above.

Once approved the sample board and techniques will serve as a standard reference for the project.

Management of design changes as required by unforeseen situations, i.e. material shortages. The mechanism for this is design change request form. Any departures from the requirements of this brief that require design approval shall be in writing as the contents of this brief will be the criteria against which the design issues will be audited.

2.10 Pre commissioning check.

A mandatory pre commissioning check, this by reviewing specific representative samples of the overall project which shall be used as a recorded quality reference check between the
CPE and site agent/COW (including the SLD process requirements) shall be completed by the CPE where after if the implementation is in accordance with the FDP, a declaration signed by the CPE stating clearly that, “The responsible Engineer and/or consulting firm responsible for the design shall warrant that the “design”* is fit for purpose and was constructed in accordance with the relevant standards and in terms of the brief and project engineering package issued for the project.”
In this regard, the said Engineer and/or firm shall indemnify Eskom against all liability, damages, expenses and/or loss which may incur as a result of the “design” not being fit for purpose In the event of an early upgrading, it will not be necessary for Eskom to prove the design was not fit for purpose but the onus shall be on the responsible Engineer and/or firm responsible for the design to prove that it was fit for purpose and/or that the early upgrading** was not unreasonable.
Design in this context refers to the implied accountability in terms of the Engineering package and its implementation.
**Upgrading in this context refers to premature repairs, retrofitting due to design inadequacies etc.

2.11 Final report.

A final design report shall be provided that will highlight deviations from the initial proposal as well as the final values obtained from the project. A signed declaration shall be included in this report. Detailed requirements to be included in the final report are, inter alia;

- Revised information is to be provided in terms of the pre engineering requirements, viz. protection, metering, system configuration etc.

- A schedule of all structure drawings, general arrangement and assembly, including ad hoc special drawings, referenced to the project and CPE including rev numbers, dates and specific amendments.

- A schedule which shows the as built drawing reference numbers as well as the final revision numbers furthermore the schedule shall provide for the signing off of the received drawings by the Eskom recipient.

- A schedule providing details relating to the earth installations, viz., Project name, structure no. and final earth value attained.

- A schedule which shall provide details relating to the installation of power driven stays, viz. Project name, power stay contractors details, quantity of stays successfully installed per category with relevant details, also details of installations where power stays were not successful.

- Copies of the approved design changes applicable to this project.

- The signed declaration by the responsible engineer who shall verify that the plant has been installed in accordance with the requirements of this brief and required specifications and standards (FDP) by virtue and on the basis of a personal site check to referenced sections to be determined by the CPE. In

this regard, the CPE shall choose representative as well as line/installation sections, which in his opinion required special applications or are identified to be high risk. Furthermore the COW is to confirm consistent application of the referenced sections.

2.12 Approval of the FRA

Once the final report has been compiled the project coordinator compiles the FRA based on total project expenditure. The CPE is to be aware of project costs, modifications and deviations. Deviation approvals serve as the means of tracking and controlling project costs and the CPE will be required to account for these as well as cross check FRA costs before the FRA approval is signed off by project engineering.

3 Specific design and stakeholder involvement requirements.

3.1 Design

With due consideration of the above phased design and execution stages, the CPE is to provide the complete electrical, structural design and feasible implementation plan so as to support the intended engineering solution, the intention of which was determined by the initiator, taking due cognisance of:

- The affected electrical system, the emerging masterplan for the specific local project area as well as the revised capacity requirements.

- The full range of technologies and requirements of the Distribution Standards.

- Where structures depicted in the Distribution standards do not meet the requirements of a particular project, and/or have an obvious error the CPE is to notify the Eskom Project Engineer by way of a design change request or a non-compliance report whichever is appropriate. Furthermore an acceptable structure which complies with the requirements of the specific issues set out in this brief are to be offered to the Eskom PES for approval, from a regional impact perspective, before implementation. A local standard structure/drawing should be considered before offering a new proposal.

- **Drawing, Survey, environmental and Data requirements as specified by the Land development department - Specific requirements included in Appendix 2 of this brief.**

- Specific issues that would impact on the alternatives offered - i.e. scope, environmental, route selection and operational requirements that can be addressed within the ambit of the Distribution standards.

3.2 Stakeholder inclusion.

The Contracting Project Engineer shall canvass the relevant stakeholder so as allow for the provision of meaningful input with regard to these issues. This should take place after the design brief and before the presentation to the **TEC**. In this regard it is mandatory for the routing form to be signed off in **sequence** by the relevant stakeholders so as to allow for the added information to serve as a basis for meaningful input by the following stakeholder. **Stakeholders may refuse discussion unless relevant information has been compiled. The relevant stakeholders are to be given at least one week's notice of intended discussions. Final TEC bookings will be dependant on the routing form being signed off in the correct sequence.**

Note: While the stakeholder input is considered important, the specific requirements are to be recorded on the standard form for the TEM to note. The CPE is obliged to weigh off the requirements from all the various imputs and proposed what is considered the most appropriate design, which is in keeping with the intention of the standards. The TEM shall have the final

ruling on issues which require specific local implementation, which may appear to be contrary to the standards.

3.3 Detailed electrical system and structural design.

Taking cognisance of the specific refurbishment requirement, the CPE is to investigate/verify where networks exist that are in reasonable condition and will be required to evaluate the cost effectiveness of retaining the whole or part of the existing network and its inclusion in the design proposal as opposed to introducing new lines, routes, configurations and technologies where these opportunities exist**.**
Important criteria in determination of the usefulness of a given existing network, also considerations for new networks where applicable, would include – **on the basis of realistic life cycle costing** - inter alia,

- General condition of the network, amount of equipment to be replaced and the comparative cost of providing a more efficient system. (Options)

- Revised planning capacity and configuration requirements.

- Operation and maintenance requirements.

- Inventory/strategic spares requirements.

- Existing earthing, insulation grading and bonding arrangement.

- Existing protection arrangement.

- The potential for future upgrades to the network.

3.4 Protection

The CPE is to:

- Verify the existing protection arrangement, fault levels and maximum operating time.

- Liaise with the Eskom protection specialists and the Head of Plant Engineering (HOPE) in order to implement the optimal protection/fault withstand capability arrangement.

- Distance to fault protection relays are included in the scope where applicable.

3.5 Earthing

- The earthing requirements are as per the Distribution Standard. Where required, the Contracting Project Engineer will be responsible for ensuring that soil resistivity tests are carried out, and that the earthing design is completed and submitted in the relevant report.

- For SWER systems, the earthing requirements are set out in the Distribution Standard Part 4. The CPE is to ensure that the soil resistivity tests are carried out and that the earthing design is completed and submitted for approval before the final BOM is completed. Members from DT are to be consulted regarding specific earthing issues- refer Telkom clearance and shared structures.

3.6 Telkom clearances and shared structures

• The principals as stated in the: Code of practice for the joint use of a pole route for power and communication lines **NRS 043** are to be followed. Due cognisance must be taken off Telkom routes, crossings and clearances.

• Due to the potential risk that the proposed use of SWER technology may interfere with and/or induce stray voltages/currents into Telkom circuits, it is important to determine where the proposed SWER scheme is likely to impact on the existing or future Telkom networks in terms of earthing, induction and/or harmonic interference. Where these are identified, the specialist calculations required in order to determine separation distances are to be completed by DT at the request of and within the project schedule of the CPE. In this regard layout design interventions may be required to obviate interference.

• The CPE is to take cognizance of crossing requirements determined in the Act as well as exemptions included in the relevant standards with special reference to **mechanical, clearance and crossing angle requirements.**

3.7 Equipment and structures

• The Contracting Project Engineer is to ensure that structures are uncluttered with regard to the amount of equipment installed and shall ensure that provision is made for safe and easy operational practice. This is especially pertinent to strain poles, switching points and transformer structures. Medium Voltage routes are to be as straight and simple as possible.

• **Correct sag and tension techniques are to be used.** In this regard, the CPE remains responsible for providing the line parameters and structure options to the survey function, furthermore, the CPE shall check the spanning sheets to ensure compliance with the parameters as well as to identify areas/sections which may require design changes due to inter alia, roads, other services, structures, etc.

• Applicable C value for ACSR conductor – 1800 and for AAAC conductor - 1425 unless otherwise specified by the PES. The CPE is to ensure that lines are templated and S&T schedules are in accordance with these values.

• Should the CPE contemplate offering structures that will require intermediate structures when stringing a second conductor for upgrade purposes the following should be noted.

• All strain and angle structures shall be rated for the full mechanical load of the upgraded system. This implies that all stays shall be rated for the final mechanical loading as well.

• Where additional intermediate structure shall be required in the event of an upgrade, these are to be marked up on the sample proposal as well as the "as built" drawings; furthermore the required positions shall be practicable.

3.8 Connections

• The following principles apply to connections.

• Earthing configurations are to be considered as both SNE and CNE services may be provided according to the project requirements.

• The CPE shall take due cognisance of the requirements relating to the application of concentric cable and the Certificate of Compliance (COC). It may be required that a loop impedance test should be included in the installation testing procedure for this project therefore allowance should be made in terms of time and cost.

• System voltage and volt drop calculations

• The voltage profile, given as a percentage of nominal, applicable to Eskom specified MV systems are: Max Voltage 102.5% Min Voltage 95 %.

• The contracting project engineer in conjunction with the relevant reticulation planner, is to take cognisance expected medium term voltage at the MV intake point for the project, shall apply a strategy that will allow for cost effective reticulation in terms of LV feeder lengths and transformer tapping, and shall ensure that the systems included the designs will meet the statutory requirements for the end user. I.e. referenced at 230V +- 10%.

• Reticmaster/lite, is to be the design tool that is used for volt drop calculations. On completion of the project, the model files are to be provided which reflect the as built system and connections.

4 Materials

• Material options will be as determined in the standard design packages. **The standard design codes applicable to the Eastern Cape Operating Unit are to be used as a reference**. Material options will be as determined in the standard design packages**.** Where specific site circumstances or technology changes which are ahead of the commercial processes require non-standard material applications and/or due to shortcomings of the standard packages, the CPE shall develop “ad Hoc” packages and submit these to the PES for approval before implementation. The components within the design packages are to be in compliance with the Eskom specification, however, should the specification not be available, then
DT/T&Q approval will be required for:

• The specification reference,

• The test facility or both.

The CPE is to ensure that the design material requirements are available, if not; a design strategy should be applied to allow for alternatives**. Where the BOM and/ or the design scope changes so as to require additional materials via the Eskom logistics system, a deviation approval request, providing the causes as well as the costs of the change shall be forwarded to the Eskom designated PE for approval before implementation. This serves as a control mechanism to check design applications, as well as BOM accuracy related to design codes/packages/CIP/SAP.**

• The Contracting Project Engineer is to ensure that the materials required for the proposed project are available, if not; a design strategy should be applied to allow for alternatives. Furthermore where standard items are contemplated which do not have an ENC or where specific requirements exist; the relevant specifications shall be attached and referenced to the BOM. Due cognizance of lead times is important, thus, it is required that where items are identified that will impact on the project schedule, a preliminary BOM containing these items and/or specifications are to be forwarded to the project manager/co-ordinator after consultation with the Eskom PES.

• Notwithstanding the above, all designs offered shall comply with the detailed requirements the Eskom Distribution Standards as amended on the date of invitation to tender. With specific reference to materials offered, all materials must be new, of the best quality and shall conform to the requirements of

the Eskom Buyers Guide (Eskom Distribution Standard Part 9) including any special interim requirements due to design review etc. An approved manufacturers schedule has been included in the Appendages It is required that prospective contractors should use this schedule in order to procure the various components to be used on this project. In the event that the prospective contractor intends to procure items from manufacturer/s which do not appear on the schedule, the contractor shall provide test certificates which shall have been approved by Eastern Cape Operating Unit T&Q in terms of the process set out below.

Where relevant, it is assumed that the CPE is fully conversant with the detailed requirements of the various Eskom Distribution Standards and except for when, contradictions, omissions and/or impractical applications which appear in the Eskom Standards are indicated in the tender, and will these be rectified in accordance with the Intentions of Distribution Technology. No compensation will be offered. Where these shortfalls are noted, the CPE is to offer a proposal and provisional rates for changes, based on these proposals which are to be included in the tender.

- In new development areas, where required, the design must allow for the use of the following standard materials. Deviations from standard commodities where long term cost savings can be achieved should be motivated within the defined process.

- Medium voltage conductor, either bare “squirrel, fox and mink” or the greased all aluminium alloy (AAAC) equivalent for coastal areas.

- Low Voltage ABC. Standard ABC conductor configurations and sizes are, single, dual and three phase bare neutral with cross sections of 70mm2 & 35mm2.

- Low voltage open wire system conductor sizes are, “squirrel, fox and mink” or the greased all aluminium alloy (AAAC) equivalent for coastal areas.
- Electrification service connections, 10mm2 and 4mm2concentric service cable.

- Distribution transformers: To SABS 780. **Specific environmental requirements are to be specified.**

- Where transformers are of the non-CSP type, the Contracting Project Engineer shall allow for reasonable operational requirements and transformer protection. Low voltage fused switches are included in the bill of packages. Fuse element ratings are to be determined by the Contracting Project Engineer and shall be in accordance with the LV protection policy.

- Wood poles (55 Mpa.) are to be correctly rated to loads required, with the emphasis appropriate efficient usage. Single pole structures which are to support transformers rated at 100 kVA or larger, are to have a minimum pole top diameter of 200 mm.

5 Land development and Data requirements.

The CPE is to include Land development is a key stakeholder and component of engineering proposals, with specific reference to the following functions.

- Engineering survey

- Environmental management

• Data management In view of this specific land development requirements are set out in **Appendix 2** of this document. The CPE is to ensure full compliance with the specified requirements.

6 Requirements in terms of procedures and reports.

6.1 Bill of packages, estimated costs and indicators:

• Should the materials be externally sourced, then a schedule of structures and activities with the relevant buyers guide (part 9) and preferred manufacturer's schedule shall be provided in the FDP.

• Where required, a bill of materials (BOM) and cost shall be derived from a bill of packages derived from regional package design codes. The regional package design codes will be made available be the regional T&Q department. The output/input format for data transfer will be as specified by the regional Data Manager. This shall be achieved by utilising the terminal made available by project engineering or by licensed remote terminals. Outputs generated from specialist design tools i.e. Power Office, CART are acceptable, provided that the Design outputs meet the above criteria. **The CPE shall check the BOM for accuracy and report discrepancies to the Eskom project engineer**. The contracting Project Engineer shall liaise directly with the Project Services section in all issues relating to Data flow.

• The CPE is to ensure that the correct design codes and quantities have been entered. Also where unique structures require manipulation of the package, these shall be thoroughly checked before upload. The Eastern Cape Operating Unit design codes are to be used as a reference.

6.2 Approvals

• The CPE engineer shall ensure that the statutory approvals for the construction of this project are obtained on behalf of ESKOM from the Authorities concerned. These approvals include the relevant environmental approvals. This is especially pertinent to Eskom services traversing privately owned land. The CPE is to notify the relevant Area project Engineer regarding the proposed refurbishment, this to minimise negative impacts on prospective minor works connections.

6.3 Refurbishment criteria - project schedule

• A basic schedule providing relevant information required for project orientation and definition is included. The contracting project engineer shall check the existing information, effect change where necessary and add information obtained from the relevant stakeholder in so much as it will have an effect on the design component.

6.4 Pole inspection reports.

• Where indicated on the basis of preliminary reports, the CPE is to initiate a pole inspection /treatment contract through the project co-ordinator before the project proposal can be formulated. The CPE is to include the following principles in the contract;
Minimum cost for P&G's by avoiding two sets of site establishment Preliminary sampling reports and assessment to determine if the full inspection is warranted (the option to curtail the inspection after a pre determined sample).

6.5 Accuracy

• The network layout must be based on both cadastral information and existing site conditions. The structure types and especially pole lengths indicated must also suit these conditions.

6.6 Site meeting

• Site meetings will be co-ordinated by the contracting project engineer and the project co-ordinator.

6.7 Design change requests. (Deviation Acceptance)

• Where non Eskom standard techniques or material types in force at the time of the brief are being proposed, written application with detailed calculations and/or test certificates to support the request (where applicable), must be forwarded to the delegated ***Eskom Project*** for acceptance, thereafter written acceptance for specific project implementation will be granted or denied. These requests will only be considered if submitted on the standard request form. A copy of this acceptance must be forwarded to the project leader or delegated COW for written acceptance before becoming effective.

• In terms of design specifications, interpretations and instructions, there are only two documents, which apply; the contents of the final design package and/or a Deviation Acceptance. It is required that the contractor should be aware of the relevant standards and revisions, and shall be obliged to raise questions to the CPE through the COW regarding apparent differences between the FDP and the relevant standard, this to be recorded in the site diary. Notwithstanding this, the requirement of the FDP and/or deviation approval shall serve as the reference for project implementation. While verbal discussion may pre-empt deviation approvals, only written approvals are to be effected.

• Notwithstanding the above, where changes are required due to incorrect initial final design package requirements, changes in the scope, or on site structure position changes which will affect the BOM included in the FDP, a deviation approval shall be submitted for approval with the delegated Eskom PE before additional materials can be procured.

6.8 Materials, procedures and design report form.

• Where issues that need design corrective measures are encountered, the above form shall be forwarded to the Project Engineer. It may be required that where latent faults or issues relating to poor material quality, design or workmanship are encountered by field staff, the contracting Project Engineer will be required to respond to such a report with corrective action proposals.

6.9 Site visits and site instructions

• The project engineering function will have automatic right to site visits; however, all requirements will be forwarded to the contracting project engineer except where obvious irregularities which may impact on safety are concerned. A site book will be signed if available.

6.10 Outage requirements

• A schedule of prospective outage requirements, which are to be based on the detailed technical implementation requirements, shall be made available at the project proposal stage. This schedule shall indicate the anticipated outage requirements in terms of duration, frequency and flexibility and is to be configured in terms of the critical minimum outage components. These components may be combined into modules, the size of which will be determined by resource availability. (Refer to the preliminary and detailed design requirements for the basis of the schedule.) This outage schedule shall be forwarded to the work management centre, so as to influence a master outage schedule.

6.11 Single Line Diagram

• Single line diagrams shall be configured, verified and provided to the “Reni” section in accordance with the single line diagram management process. In terms of this process, the CPE is directly responsible for the correct SLD being implemented. Medium voltage phase connectivity (two phase and SWER) is to be provided on the prelim SLD compilation.

I…….. Appointed as CPE for the above project understands and accept the requirements set out in the above brief.

Signed:

Date:

6.12 Schedule of Appendices applicable to this brief.

• **Appendices**	• **Title**	• **Application**	• **Rev/date**
• Appendix 1.1	• Fundamental requirements for line refurbishment/upgrade contracts.	• Refurbishment fundamentals.	•
• Appendix 1.2	• New line/Refurbishment Criteria – Project specific	• Fundamental line design parameters.	•
• Appendix 1.3	• Final design and final report check sheets and cover page.	• Check sheets to ensure compliance with brief.	•
• Appendix 1.4	• Asset to be dismantled.	• To be completed Where dismantling/ decommissioning occurs – DRA compilation.	•
• Appendix 1.5	• CBA pro forma	• To be completed for all projects classified as “strategic”.	•
• Appendix 1.6	• FEM pro forma	• To be completed for all projects classified as “economic”.	•
• Appendix 1.7	• Preferred material schedule and sample line requirements.	• To be applied to project sample reviews.	•
• Appendix 1.8	• NETWORK SERVICES PLANT NEW & REFURB PROJECT SCOPE REQUIREMENTS AND TEC CHECKLIST	• To be completed by the HOPE during project stakeholder discussions.	•
• Appendix 1.9	• RIC – EASTERN CAPE OPERATING UNIT • STANDARD CHECK LIST FOR ALL REFURBISHMENT/ MAJOR MAINTENANCE PROJECTS.	• To be completed before presentation to the RIC. – **Suspended.**	•
• Appendix 1.10	• Project Engineering - Critical Stakeholder notification and response, check sheet.	• To be completed before presentation to the TEC.	•
• Appendix	• **Title**	• **Application**	• **Rev/date**
• Appendix 1.11	• Application for approval for a deviation from the requirements of the distribution standard.	• Non-standard technology applications to the project/DT standard does not provide application.	•
• Appendix 1.12	• **PROJECT ENGINEERING DEPARTMENT. NONCONFORMANCE REPORT**	• **Non conformance to the design package to be controlled to close out.**	•
• Appendix 2.1	• STANDARDISATION OF • ELECTRIFICATION • DRAWINGS ☿ ***EASTERN CAPE OPERATING UNIT*** ☿ ***PART 1*** ☿ ***URBAN DEVELOPMENT***	• Land development drawing requirements.	•

• **PART 2 - RURAL DEVELOPMENT**	•	•	•
• Appendix 2.3	• SPECIFICATION FOR THE SUPPLY OF LAND DEVELOPMENT DATA COMPONENTS.	• Data requirements applied to specific projects.	•
• Appendix 2.4	• LOCATION DATA REQUIREMENTS FOR REFURBISHMENTPROJECTS.	• Data requirements applied to specific projects.	•

A5 General Substation Power Plant Work

1. The Employer's Objectives

To ensure the effective and efficient design of distribution capital projects as part of the annual capital plan. The consultant will be an extension to the existing manpower resource in the Network Engineering and Design Department, producing outputs, as and when required, as defined in the capital process. Typical services to be provided can be divided into two distinct phases, viz Project Approval and Detail Design phases.

1.1 Definition Release Approval (Project Approval or Preliminary Design Stage)

The main purpose of the prelim design phase of a project is to determine the best design alternative which will satisfy the conceptual design, costs and need date. The completed preliminary design is presented to the Technical Evaluation Committee (TEC) for support to present it to the Investment Committee for final approval.

The Preliminary design document is to include the following:

• Reference to the relevant Concept Release Approval as to the need and requirements of the project. An extract of the motivation can also be summarized and included for completeness.

• Alternative designs reviewed and reason for rejection/acceptance.

• Alternative chosen.

• Detailed Scope of Works which must include a functional specification, a major equipment schedule, a cost estimate breakdown, constructability details, sufficient drawings and or maps to adequately describe the design, an environmental comment and the same detail for any control plant items that apply to the project.
NB: The detailed Scope of Works should be fine tuned during the Functional Scope of Works meeting to minimize a possible rejection of the chosen design alternative at the final Technical Evaluation Committee (TEC) approval.

1.2 Detail Design Stage

The main purpose of the detailed design is to convert the approved preliminary design into working drawings, specifications and bills of materials to enable a suitably qualified contractor to carry out the construction of the required asset. This is referred to as the Final Design Package. The Final Design Package must consist of the following:

• The approved DRA (Form 15) and Project Proposal.

• A complete detailed design including specifications, bills of materials, drawings and any other documentation that would be required to enable a qualified Contractor to quote on the supply, delivery and erection of the required asset. The Specific Scope of Work and Project Process for each project will be provided and agreed every time the service is used.

Note: The consultant will have no claim at completion of a stage to be appointed to complete the stages following or the specific capital work that might arise as a result of his involvement.

2. Receivables

2.1 The Employer shall provide:

All available information for the specific Scope of Works for each project will be made available. It remains the responsibility of the *consultant* to request the below mentioned receivables and mobilizing relevant stakeholders for participation.

2.2 Definition Release Approval

• Project schedule as agreed to in the Resource Planning Meeting.

• List of the Employers Capital Process stake holders, contact person and telephone number to be used.

• Planning Report (Project Background).

• Available Scope of Works including the output specifications.

• Land development package (survey, environment, geo-mapping, land & right).

• Available network specifications.

• Network performance data (if required).

• Detail of information to be captured.

• Details for condition audit reports.

• Design philosophy requirements.

• Economical model with indicators.

• Financial and technical parameters.

2.3 Detail Design Stage

• Design criteria.

• Works procedures to be followed.

• Drawing specifications and numbering.

• Material specification (Buyers guide).

- Network requirements.

- Plant requirements.

- Environmental requirements.

- Customer requirements.

- Primary and Secondary Plant philosophies.

- Design document formats to be used and any other preferences that the Consultant should allow for in the design.

All designs will be in accordance to Eskom specifications and can be obtained from Distribution Technology. The Consultant will assure the latest specifications are used.

Note: COPYRIGHT ON ALL DRAWINGS AND INTELLECTUAL PROPERTY RIGHTS REMAINS WITH ESKOM.

3. Deliverables

The Consultant shall deliver, inter alia:

3.1 Definition Release Approval

- Consultation on technical matters with authorities and interested parties other than those having rights or powers of sanction and making modifications to the preliminary design of the Project arising out of such consultation.

- Investigation and collection of available data, drawings and plans relating to the Project.

- Submission of a detail technical design philosophy report for primary and/or secondary plant.

- Establishment of final design criteria.

- Advice to the Employer as to the need for any further surveys, analyses, tests and site or other investigations which may be required and arranging for these to be carried out at the Employer's expense (if accepted by the Employer).

- Preparation of any preliminary plans, drawings and estimates required for seeking the capital approval.

- Preparing economical evaluation for project financial feasibility.

- Presenting the preliminary design to the Technical Evaluation Committee for recommendation.

- Presenting the proposed project at the Capital Investment Committee for final approval.

3.2 Design Stage

Following the Employer's instruction to proceed, the preparation of all documents necessary to enable tenders for the Works to be called for or for the Works to be other-wise placed by the Employer, including all or any of the following:

• Advice to the *Employer* as to the necessity for further surveys, special visits, use of specialist *Consultants*, setting out or staking out the Works, etc. and arranging for such to be carried out at the *Employer's* expense.

• Compilation of the complete Design Package consisting of detail scope of works, technical specifications (complete with bill of quantities and detail specifications for tender purposes), bills of material, the necessary design documentation and drawings.

• Provision of information necessary for the design of other services.

• Submission of updated and revised estimates of cost, time and financial implications.
• Technical evaluation of tenders and submission of recommendations on the acceptance of tenders.

• Capturing network data for records.

• Regular site visits.

• Attending Project Progress meetings.

• Provide an after service on the design (updating and corrections if required).

• The Consultant will take full responsibility for the design, but in accordance to the design process a competent person must verify the design. Finally, the documentation will be checked and accepted by the Employer.

4. Design Tools

The consultant shall utilize design tools as approved by Eskom. Currently the minimum design tools for substation work are:

• Microstation V8

• Power Office (Costing tool)

• Capital Assist

• AutoGrid Pro (Two-Layer Soil & Soil Resistivity & Fault Current Distribution)

• ProjectWise (database)

• MS Project

A6 Substation Civil /Geotechnical Design & Drawing Work

1. Employers objectives

Obtain a complete Geotechnical assessment of the site (including tests and report), Obtain a Topographic surveys. Obtain a complete and executable Civil Design Package. Complete and accurate drawings/designs done according to the Eskom standards and SANS references.The final product to be a complete set of drawings for substations in Microstation format.

2. Receivables

- Existing drawings of the substation
- Microstation cells
- Preliminary designs
- Draughting standards
- BOM's
- Functional scope of work document

3. Deliverables

- Station electric diagrams
- Site plans
- Earthmat layout
- Foundation layout
- Oil containment area
- Sections and clamps
- Steelwork layout
- Electrical equipment layout
- Standard drawing changes

- Geotechnical Surveys
  Material investigation

a) Test Pits.
b) DCP investigation

- Topographic Surveys

a) Site Identification
b) Signed Options
c) Fixing per point (control, site beacons)
d) Tachy survey
e) Contouring & drawing

- <u>Complete Civil designs</u>

a) Site Plan
   - Cut & Fill
   - Application of the geotechnical report
b) Drainage
c) Structural
d) Foundation
a) Structural designs

4. Specifications and Data Descriptions

- Draughting standards
- Microstation cells
- Single line for planned layout
- Drawing numbering standards
- Title block standards for drawings

5. Activity List (Work Breakdown)

- Final designs for the above mentioned substation

A7 Electrical Engineering Services for Control Plant

1. Employers objectives

Complete accurate final designs for control plant done according to the Eskom standards.

2. Receivables

Control Plant Design templates will be provided for the following:

- AC/DC Board (wall mount)
- AC/DC Panel (combined with chop-over)
- AC/DC Panel (combined no chop-over)
- AC Panel
- DC Panel
- Building DB board & yard lighting
- Trfr Scheme with DIFF
- Trfr Scheme excluding DIFF
- Trfr Feeder scheme
- OLTC Scheme
- Three pole distance scheme
- Single pole distance scheme
- Current DIFF scheme
- Rural feeder schemes
- Cable feeder scheme (outdoor)
- Cable feeder scheme (indoor)
- Bus zone Scheme - Single Zone
- Bus zone Scheme - Double Zone
- Indoor bus zone - Vamp (1 master)
- Indoor bus zone - Vamp (2 master)
- Bus Sections/Coupler control module
- Bus Sections/Coupler protection module
- 22kV Capacitor Bank
- Metering Modules
- Vectograph
- VT Junction boxes
- CT Junction boxes
- Isolator Junction boxes
- UFLS Scheme
- Cable Block Diagrams
- Panel Layout & Label Engraving
- GPS Time Synchronizer
- KoCos Recorder
- Remote Access
- Control Room Layout
- Oil Containment Dam Pump Controls
- Cable Schedule & BOM
- Updated costing spreadsheet
- Updated Scope of Work
- Variance Order for Additional Material

- List of Availables
- Label Schedule
- As builts
- Bills of Materials
- Primary Plant Single Line Diagram SLD/Station Electric Diagram SED
- Primary Plant Sub-station layout design
- Primary plant manuals and catalogues
- Drawing numbers to be used for the specific project
- Weekly progress report sheet
- Schedule of design

As well as the following standards, this will be issued once yearly or as updated:

- ED Costing Spreadsheet (Excel)
- Microstation cells
- Cable numbering standards
- Draughting standards
- Title block standards for drawings

3. Deliverables

Control plant designs for the following:

- Preliminary Cable Schedule & Cable Bill of Material – Must be delivered 4 weeks after appointment
- AC/DC Board (wall mount)
- AC/DC Panel (combined with chop-over)
- AC/DC Panel (combined no chop-over)
- AC Panel
- DC Panel
- Building DB board & yard lighting
- Trfr Scheme with DIFF
- Trfr Scheme excluding DIFF
- Trfr Feeder scheme
- OLTC Scheme
- Three pole distance scheme
- Single pole distance scheme
- Current DIFF scheme
- Rural feeder schemes
- Cable feeder scheme (outdoor)
- Cable feeder scheme (indoor)
- Bus zone Scheme - Single Zone
- Bus zone Scheme - Double Zone
- Indoor bus zone - Vamp (1 master)
- Indoor bus zone - Vamp (2 master)
- Bus Sections/Coupler control module
- Bus Sections/Coupler protection module
- 22kV Capacitor Bank
- Metering Modules
- Vectograph
- VT Junction boxes
- CT Junction boxes
- Isolator Junction boxes
- UFLS Scheme
- Cable Block Diagrams
- Panel Layout & Label Engraving
- GPS Time Synchronizer
- KoCos Recorder
- Remote Access

- Control Room Layout
- Oil Containment Dam Pump Controls
- Updated costing spreadsheet
- Updated Scope of Work
- Variance Order for Additional Material
- List of Availables
- Label Schedule
- As builts
- Control room layout
- Cable block diagrams – Must be delivered 4 weeks after appointment
- Panel layout & label engraving diagrams
- Label schedule
- Final Cable schedule with cable BOM done in the costing spreadsheet
- Updated FSOW according to any deviations during the final design stage
- Variance order for all additional material required
- Costing PRF – Accuracy required: High Level
- Costing CRA – Accuracy required: 65%
- Costing DRA – Accuracy required: 85%
- Costing ERA – Accuracy required: 95%
- Costing Customer Project – Feasibility Quotation: Accuracy – 65%
- Costing Customer Project – Budget Quotation: Accuracy – 95%
- TEC Presentation
- Weekly progress report (Excel format)
- All photos taken of Eskom equipment (jpeg format)

4. Activity List (Work Breakdown)

- Final designs for the above mentioned project.
- A full set of drawings on a CD in Microstation format, as well as all photos taken of Eskom equipment in .jpeg format (Not Re-Writable).
- Draughted secondary plant drawings in Microstation format.
- 3 Full sets of A3 drawings delivered to Eskom, printed and approved.
- 3 Full sets of A3 “as-built” drawings printed and approved within 30 days after receipt of the commissioning markups.