



## NEC3 Engineering & Construction Contract

Between **ESKOM HOLDINGS SOC Ltd**  
(Reg No. 2002/015527/30)

and **[Insert at award stage]**  
(Reg No. \_\_\_\_\_ )

for **Duvha Upgrade of outside plant control room HMI**

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**CONTRACT No. [Insert at award stage]**

## Part C1: Agreements & Contract Data

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**Contents:**

**No of  
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**C1.1 Form of Offer and Acceptance**

**[•]**

[to be inserted from Returnable Documents at award stage]

**C1.2a Contract Data provided by the *Employer***

**[•]**

**C1.2b Contract Data provided by the *Contractor***

**[•]**

[to be inserted from Returnable Documents at award stage]

**C1.3 Proforma Guarantees**

**[•]**

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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:

### Duvha Upgrade of outside plant control room HMI

The tenderer, identified in the Offer signature block, has examined the documents listed in the Tender Data and addenda thereto and by submitting this Offer has accepted the Conditions of Tender.

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 *Contractor* 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.

Options A	The offered total of the Prices exclusive of VAT is	R [●]
	Value Added Tax @ 14% is	R [●]
	The offered total of the amount due inclusive of VAT is <sup>1</sup>	R [●]
	(in words) [●]	

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 *Contractor* 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

Tenderer's CIDB registration number (if applicable)

<sup>1</sup> This total is required by the *Employer* for budgeting purposes only. Actual amounts due will be assessed in terms of the *conditions of contract*.

**Duvha Upgrade of outside plant control room HMI****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 Contractor 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: Works Information
Part C4	Site Information

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 original copy signed between them of this document, including the Schedule of Deviations (if any).

Unless the tenderer (now *Contractor*) within five working days of the date of such receipt notifies the Employer in writing of any reason why he cannot accept the contents of this agreement, this agreement shall constitute a binding contract between the Parties.

Signature(s)

Name(s)

Capacity

**for the  
Employer**

(Insert name and address of organisation)

Name &  
signature of  
witness

Date

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

**Duvha Upgrade of outside plant control room HMI****Schedule of Deviations to be completed by the *Employer* prior to contract award**

Note:

1. 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)**(Insert name and address of organisation)*Name &  
signature  
of witness

Date

## C1.2 ECC3 Contract Data

### Part one - Data provided by the *Employer*

Completion of the data in full, according to the Options chosen, is essential to create a complete contract.

Clause	Statement	Data
1	<b>General</b>	
	The <i>conditions of contract</i> are the core clauses and the clauses for main Option	
	dispute resolution Option	<b>A: Priced contract with activity schedule</b>
	and secondary Options	<b>W1: Dispute resolution procedure</b>
		<b>X2: Changes in the law</b>
		<b>X5: Sectional Completion</b>
		<b>X7: Delay damages</b>
		<b>X16: Retention</b>
		<b>X17: Low performance damages</b>
		<b>X18: Limitation of liability</b>
		<b>Z: Additional conditions of contract</b>
	of the NEC3 Engineering and Construction Contract, April 2013 (ECC3)	
10.1	The <i>Employer</i> is (Name):	<b>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</b>
	Address	<b>Registered office at Megawatt Park, Maxwell Drive, Sandton, Johannesburg</b>
10.1	The <i>Project Manager</i> is: (Name)	<b>Takalani Mashamba</b>
	Address	<b>Duvha Power Station</b>
	Tel	<b>+27 11 800 3344</b>
	Fax	<b>+27 86 600 0028</b>
	e-mail	<b><a href="mailto:mashamta@eskom.co.za">mashamta@eskom.co.za</a></b>
10.1	The <i>Supervisor</i> is: (Name)	<b>Lemuel Zwart</b>
	Address	<b>Duvha Power Station</b>
	Tel No.	<b>+27 13 690 0104</b>

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Fax No.

e-mail

11.2(13)	The <i>works</i> are	<b>Duvha Upgrade of Outside Plant Control Room HMI</b>	
11.2(14)	The following matters will be included in the Risk Register	<b>Unavailability of Responsible Person or authorised supervisor</b>	
11.2(15)	The <i>boundaries of the site</i> are	<b>Duvha Power Station Outside plant control room</b>	
11.2(16)	The Site Information is in	<b>Part 4: Site Information of the scope of work</b>	
11.2(19)	The Works Information is in	<b>Part 3: Scope of Work and all documents and drawings to which it makes reference.</b>	
12.2	The <i>law of the contract</i> is the law of	<b>the Republic of South Africa</b>	
13.1	The <i>language of this contract</i> is	<b>English</b>	
13.3	The <i>period for reply</i> is	<b>one week</b>	
<b>2</b>	<b>The Contractor's main responsibilities</b>	<b>Upgrade of outside plant control room HMI</b>	
<b>3</b>	<b>Time</b>		
11.2(3)	The <i>completion date</i> for the whole of the <i>works</i> is	<b>12 Months</b>	
11.2(9)	The <i>key dates</i> and the <i>conditions</i> to be met are:	<b>Condition to be met</b>	<b>key date</b>
		1 Start date	Completion: Twelve (12) months after the contract is awarded.
30.1	The <i>access dates</i> are:	<b>Part of the Site</b>	<b>Date</b>
		1 Outside plant control room HMI	After the contract is awarded
		2	
		3	
31.1	The <i>Contractor</i> is to submit a first programme for acceptance within	<b>One (1) weeks of the Contract Date.</b>	
31.2	The <i>starting date</i> is		

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32.2	The <i>Contractor</i> submits revised programmes at intervals no longer than	<b>One (1) week (Schedule and cashflow)</b>
35.1	The <i>Employer</i> is not willing to take over the <i>works</i> before the Completion Date.	[No data needed if this statement is included]
<b>4</b>	<b>Testing and Defects</b>	
42.2	The <i>defects date</i> is	<b>52weeks after Completion of the whole of the works.</b>
43.2	The <i>defect correction period</i> is	<b>08 hours for emergencies or breakdowns and 4 working days for normal defects.</b>
	except that the <i>defect correction period</i> for	<b>Four (4) days</b>
	and the <i>defect correction period</i> for	<b>Four (4) days</b>
<b>5</b>	<b>Payment</b>	
50.1	The <i>assessment interval</i> is	<b>25th day of each successive month.</b>
51.1	The <i>currency of this contract</i> is the	<b>South African Rand.</b>
51.2	The period within which payments are made is	<b>30 days</b>
51.4	The <i>interest rate</i> is	<p>the publicly quoted prime rate of interest (calculated on a 365 day year) charged from time to time by the Standard Bank of South Africa Limited (as certified, in the event of any dispute, by any manager of such bank, whose appointment it shall not be necessary to prove) for amounts due in Rands and</p> <p>(ii) 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 <i>mutatis mutandis</i> 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.</p>
<b>6</b>	<b>Compensation events</b>	
60.1(13)	The place where weather is to be recorded is:	<b>Duvha Power Station</b>
	The <i>weather measurements</i> to be recorded for each calendar month are,	<b>the cumulative rainfall (mm)</b>



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the number of days with rainfall more than 10 mm

the number of days with minimum air temperature less than 0 degrees Celsius

the number of days with snow lying at 09:00 hours South African Time

and these measurements:

The *weather measurements* are supplied by

**The South African weather Services**

The *weather data* are the records of past *weather measurements* for each calendar month which were recorded at:

**Duvha Power Station**

and which are available from:

**the South African Weather Bureau and included in Annexure A to this Contract Data provided by the *Employer***

60.1(13)	Assumed values for the ten year return <i>weather data</i> for each <i>weather measurement</i> for each calendar month are:	<p><b>As stated in Annexure A to this Contract Data provided by the <i>Employer</i>.</b></p> <p>Note: If this arrangement is used, delete the rows above for 60.1(13) and delete this note.</p>
<b>7</b>	<b>Title</b>	There is no reference to Contract Data in this section of the core clauses and terms in italics used in this section are identified elsewhere in this Contract Data.
<b>8</b>	<b>Risks and insurance</b>	
80.1	These are additional <i>Employer's</i> risks	<b>1. Availability of an AP (Appointed Person) /RP (Responsible Person) Safety risk</b>
84.1	The <i>Employer</i> provides these insurances from the Insurance Table	<p><b>as stated for "Format A (Contractors All Risk insurance Policy) available on request from Eskom Insurance Management Services</b></p> <p><b>(See Annexure B for basic guidance)</b></p>
84.1	The <i>Contractor</i> provides these additional insurances:	
84.2	The insurance against loss of or damage to the <i>works</i> , Plant and Materials is to include cover for Plant and Materials provided by the <i>Employer</i> for an amount of	<b>100 000.00</b>
84.2	The minimum limit of indemnity for insurance in respect of loss of or damage to property (except the <i>works</i> , Plant, Materials and Equipment) and liability for bodily injury to or death of a person (not an employee of the <i>Contractor</i> ) caused by activity in connection with this contract for any one event is	<b>whatever the <i>Contractor</i> deems necessary in addition to that provided by the <i>Employer</i>.</b>
84.2	The minimum limit of indemnity for insurance in respect of death of or bodily	<b>As prescribed by the Compensation for Occupational Injuries and Diseases Act No. 130</b>

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injury to employees of the *Contractor* arising out of and in the course of their employment in connection with this contract for any one event is

of 1993 and the *Contractor's* common law liability for people falling outside the scope of the Act with a limit of Indemnity of not less than R500 000 (Five hundred thousand Rands).

<b>9</b>	<b>Termination</b>	<p>Clause 90.1 In writing either party should send a notification giving reasons for terminating the contractor's obligation and if the reasons comply with this contract, then a termination certificate should be issued to both parties.</p> <p>Clause 90.2 The contractor may terminate only for the reasons identified in the termination table and the employer may terminate for any reason. Refer to Clause 90.3, 90.4 and 90.5</p>
<b>10</b>	<b>Data for main Option clause</b>	
<b>A</b>	<b>Priced contract with activity schedule</b>	Option A to be used.
60.6	The <i>method of measurement</i> is	As stated in Part C2.1, Pricing Assumptions.
<b>11</b>	<b>Data for Option W1</b>	
W1.1	The <i>Adjudicator</i> is	the person selected from the ICE-SA Division (or its successor body) of the South African Institution of Civil Engineering Panel of Adjudicators by the Party intending to refer a dispute to him. (see <a href="http://www.ice-sa.org.za">www.ice-sa.org.za</a> ). If the Parties do not agree on an Adjudicator the Adjudicator will be appointed by the Arbitration Foundation of Southern Africa (AFSA).
	Address	TBA
	Tel No.	[•]
	Fax No.	[•]
	e-mail	[•]
W1.2(3)	The <i>Adjudicator nominating body</i> is:	the Chairman of ICE-SA a joint Division of the South African Institution of Civil Engineering and the London Institution of Civil Engineers. (See <a href="http://www.ice-sa.org.za">www.ice-sa.org.za</a> ) or its successor body.
W1.4(2)	The <i>tribunal</i> is:	arbitration.
W1.4(5)	The <i>arbitration procedure</i> 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	South Africa
	The person or organisation who will choose an arbitrator	
	- if the Parties cannot agree a choice or	the Chairman for the time being or his nominee
	- if the arbitration procedure does not state who selects an arbitrator, is	of the Association of Arbitrators (Southern Africa) or its successor body.

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12	Data for secondary Option clauses											
X2	Changes in the law											
X5	Sectional Completion											
X5.1	The <i>completion date</i> for each <i>section</i> of the <i>works</i> is:	<table><tr><th>Section</th><th>Description</th><th>Completion date</th></tr><tr><td>1</td><td>Upgrade of outside plant room HMI</td><td></td></tr><tr><td>2</td><td></td><td></td></tr></table>	Section	Description	Completion date	1	Upgrade of outside plant room HMI		2			
Section	Description	Completion date										
1	Upgrade of outside plant room HMI											
2												
X7	Delay damages											
X7.1	Delay damages for Completion of the whole of the <i>works</i> are	R1500 per day to the maximum of 4 % aligned to the milestone contract value as per the baseline program.										
X16	Retention											
	The <i>retention percentage</i> is	10% of the total contract value										
X17	Low performance damages											
X17.1	The amounts for low performance damages are: <b>Performance level</b> <ul style="list-style-type: none"><li>Two or more days late delivery of equipment after the agreed upon date as per the project schedule will amount to R2500 per day.</li></ul>											
X18.2	For any one event, the <i>Contractor's</i> liability to the <i>Employer</i> for loss of or damage to the <i>Employer's</i> property is limited to:	the amount of the deductibles relevant to the event described in the insurance policy format selected in the data for clause 84.1 above, which policy is available on <a href="http://www.eskom.co.za/Tenders/InsurancePoliciesProcedures/Pages/EIMS_Policies_From_1_April_2014_To_31_March_2015.aspx">http://www.eskom.co.za/Tenders/InsurancePoliciesProcedures/Pages/EIMS_Policies_From_1_April_2014_To_31_March_2015.aspx</a>										
X18.3	The <i>Contractor's</i> liability for Defects due to his design which are not listed on the Defects Certificate is limited to	The greater of <ul style="list-style-type: none"><li>the total of the Prices at the Contract Date and</li><li>the amounts excluded and unrecoverable from the <i>Employer's</i> assets policy for correcting the Defect (other than the resulting physical damage which is not excluded) plus R15M first amount payable in terms of the <i>Employer's</i> assets policy.</li></ul>										
X18.4	The <i>Contractor's</i> total liability to the	the total of the Prices other than for the										

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	<p><i>Employer</i> for all matters arising under or in connection with this contract, other than excluded matters, is limited to:</p>	<p><b>additional excluded matters.</b></p> <p><b>The <i>Contractor's</i> total liability for the additional excluded matters is not limited.</b></p> <p><b>The additional excluded matters are amounts for which the <i>Contractor</i> is liable under this contract for</b></p> <ul style="list-style-type: none"> <li>• Defects due to his design which arise before the Defects Certificate is issued,</li> <li>• Defects due to manufacture and fabrication outside the Site,</li> <li>• loss of or damage to property (other than the <i>works</i>, Plant and Materials),</li> <li>• death of or injury to a person and</li> <li>• infringement of an intellectual property right.</li> </ul>
X18.5	The <i>end of liability date</i> is	<p>(i) 1(One) year after the <i>defects date</i> for latent Defects and</p> <p>(ii) the date on which the liability in question prescribes in accordance with the Prescription Act No. 68 of 1969 (as amended or in terms of any replacement legislation) for any other matter.</p> <p>A latent Defect is a Defect which would not have been discovered on reasonable inspection by the <i>Employer</i> or the <i>Supervisor</i> before the <i>defects date</i>, without requiring any inspection not ordinarily carried out by the <i>Employer</i> or the <i>Supervisor</i> during that period. If the <i>Employer</i> or the <i>Supervisor</i> do undertake any inspection over and above the reasonable inspection, this does not place a greater responsibility on the <i>Employer</i> or the <i>Supervisor</i> to have discovered the Defect.</p>
<b>Z</b>	<b>The <i>Additional conditions of contract</i> are</b>	<b>Z1 to Z12 always apply.</b>
<b>Z1</b>	<b>Cession delegation and assignment</b>	
Z1.1	The <i>Contractor</i> does not cede, delegate or assign any of its rights or obligations to any person without the written consent of the <i>Employer</i> .	
Z1.2	Notwithstanding the above, the <i>Employer</i> may on written notice to the <i>Contractor</i> 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.	
<b>Z2</b>	<b>Joint ventures</b>	
Z2.1	If the <i>Contractor</i> 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	

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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 *Project Manager* within two weeks of the Contract Date of the key person who has the authority to bind the *Contractor* on their behalf.

Z2.3 The *Contractor* 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 *Contractor* in writing.

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

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

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

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

Z3.4 Failure by the *Contractor* 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 P1, P2 and P3 as stated in clause 92, and the amount due is A1 and A3 as stated in clause 93.

### **Z4 Ethics**

Z4.1 Any offer, payment, consideration, or benefit of any kind made by the *Contractor*, 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 *Contractor's* obligation to Provide the Works or taking any other action as appropriate against the *Contractor* (including civil or criminal action).

Z4.2 The *Employer* may terminate the *Contractor's* obligation to Provide the Works if the *Contractor* (or any member of the *Contractor* where the *Contractor* 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 *Contractor* or any such member is removed from the an approved vendor data base of the *Employer* as a consequence of such practice.

Z4.3 Notwithstanding the provisions of core clause 90.2, the procedures on termination in terms of this clause are P1, P2 and P3 as stated in the core clause 92 and the amount due is A1 and A3 as stated in core clause 93.

### **Z5 Confidentiality**

Z5.1 The *Contractor* 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 *Contractor*, enters

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the public domain or to information which was already in the possession of the *Contractor* at the time of disclosure (evidenced by written records in existence at that time). Should the *Contractor* disclose information to Others in terms of clause 25.1, the *Contractor* ensures that the provisions of this clause are complied with by the recipient.

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

Z5.3 In the event that the *Contractor* is, at any time, required by law to disclose any such information which is required to be kept confidential, the *Contractor*, 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 *Contractor* 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 *works* or any portion thereof, in the course of Providing the Works and after Completion, requires the prior written consent of the *Project Manager*. All rights in and to all such images vests exclusively in the *Employer*.

Z5.5 The *Contractor* ensures that all his subcontractors abide by the undertakings in this clause.

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**Z6 Waiver and estoppel: Add to core clause 12.3:**


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Z6.1 Any extension, concession, waiver or relaxation of any action stated in this contract by the Parties, the *Project Manager*, the *Supervisor*, 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.

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**Z7 Health, safety and the environment: Add to core clause 27.4**


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Z7.1 The *Contractor* undertakes to take all reasonable precautions to maintain the health and safety of persons in and about the execution of the *works*. Without limitation the *Contractor*:

- accepts that the *Employer* may appoint him as the "Principal Contractor" (as defined and provided for under the Construction Regulations 2014 (promulgated under the Occupational Health & Safety Act 85 of 1993) ("the Construction Regulations") for the Site;
- warrants that the total of the Prices as at the Contract Date includes a sufficient amount for proper compliance with the Construction Regulations, all applicable health & safety laws and regulations and the health and safety rules, guidelines and procedures provided for in this contract and generally for the proper maintenance of health & safety in and about the execution of *works*; and
- undertakes, in and about the execution of the *works*, to comply with the Construction Regulations and with all applicable health & safety laws and regulations and rules, guidelines and procedures otherwise provided for under this contract and ensures that his Subcontractors, employees and others under the *Contractor's* direction and control, likewise observe and comply with the foregoing.

Z7.2 The *Contractor*, in and about the execution of the *works*, complies with all applicable environmental laws and regulations and rules, guidelines and procedures otherwise provided for under this contract and ensures that his Subcontractors, employees and others under the *Contractor's* direction and control, likewise observe and comply with the foregoing.

---

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<b>Z8</b>	<b>Provision of a Tax Invoice and interest. Add to core clause 51</b>
Z8.1	Within one week of receiving a payment certificate from the <i>Project Manager</i> in terms of core clause 51.1, the <i>Contractor</i> provides the <i>Employer</i> with a tax invoice in accordance with the <i>Employer's</i> procedures stated in the Works Information, showing the amount due for payment equal to that stated in the payment certificate.
Z8.2	If the <i>Contractor</i> does not provide a tax invoice in the form and by the time required by this contract, the time by when the <i>Employer</i> is to make a payment is extended by a period equal in time to the delayed submission of the correct tax invoice. Interest due by the <i>Employer</i> in terms of core clause 51.2 is then calculated from the delayed date by when payment is to be made.
Z8.3	The <i>Contractor</i> (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 <i>Employer's</i> VAT number 4740101508 on each invoice he submits for payment.
<b>Z9</b>	<b>Notifying compensation events</b>
Z9.1	Delete from the last sentence in core clause 61.3, "unless the <i>Project Manager</i> should have notified the event to the <i>Contractor</i> but did not".
<b>Z10</b>	<b><i>Employer's</i> limitation of liability</b>
Z10.1	The <i>Employer's</i> liability to the <i>Contractor</i> for the <i>Contractor's</i> indirect or consequential loss is limited to R0.00 (zero Rand)
Z10.2	The <i>Contractor's</i> entitlement under the indemnity in 83.1 is provided for in 60.1(14) and the <i>Employer's</i> liability under the indemnity is limited.
<b>Z11</b>	<b>Termination: Add to core clause 91.1, at the second main bullet point, fourth sub-bullet point, after the words "against it":</b>
Z11.1	or had a business rescue order granted against it.
<b>Z12</b>	<b>Addition to secondary Option X7 Delay damages (if applicable in this contract)</b>
Z12.1	If the amount due for the <i>Contractor's</i> payment of delay damages reaches the limits stated in this Contract Data for Option X7 or Options X5 and X7 used together, the <i>Employer</i> may terminate the <i>Contractor's</i> obligation to Provide the Works using the same procedures and payment on termination as those applied for reasons R1 to R15 or R18 stated in the Termination Table.

**Duvha Upgrade of outside plant control room HMI****Annexure A: One-in-ten-year-return weather data obtained from SA Weather Bureau for [weather station]**

If any one of these *weather measurements* recorded within a calendar month, before the Completion Date for the whole of the *works* and at the place stated in this Contract Data is shown to be more adverse than the amount stated below then the *Contractor* may notify a compensation event.

	<i>Weather measurement</i>				
Month	Cumulative rainfall (mm)	Number of days with rain more than 10mm	Number of days with min air temp < 0 deg.C	Number of days with snow lying at 08:00 CAT	[Other measurements if applicable]
January	119	11	0	<b>0</b>	N/A
February	127	<b>9</b>	0	0	N/A
March	132	9	0	0	N/A
April	84	7	0	0	N/A
May	56	4	0	0	N/A
June	33	3	0	0	N/A
July	36	3	0	0	N/A
August	48	4	0	0	N/A
September	74	6	0	0	N/A
October	109	10	0	0	N/A
November	117	11	0	0	N/A
December	119	12	0	0	N/A

Only the difference between the more adverse recorded weather and the equivalent measurement given above is taken into account in assessing a compensation event.



**Duvha Upgrade of outside plant control room HMI****Annexure B: Insurance provided by the Employer**

*These notes are provided as guidance to tendering contractors and the Contractor about the insurance provided by the Employer. The Contractor must obtain its own advice. Details of the insurance itself are available from the internet web link given below.*

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. For ECC3 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. Tendering contractors should note that cover provided by the *Employer* is only per the policies available on the internet web link listed below and may not be the cover required by the tendering contractor or as intended by each of the listed insurances in the left hand column of the Insurance Table in clause 84.2. In terms of clause 84.1 “the *Contractor* provides the insurances stated in the Insurance Table except any insurance which the *Employer* is to provide”. Hence the *Contractor* provides insurance which the *Employer* does not provide and in cases where the *Employer* does provide insurance the *Contractor* insures for the difference between what the Insurance Table requires and what the *Employer* provides.
4. When the Marine Insurance is required the *Contractor* needs to obtain a copy of the latest edition of Eskom’s Marine Policies Procedures found at internet website given below.
5. Further information and full details of all Eskom provided policies and procedures may be obtained from:

[http://www.eskom.co.za/live/content.php?Item\\_ID=9248](http://www.eskom.co.za/live/content.php?Item_ID=9248)

## C1.2 Contract Data

### Part two - Data provided by the *Contractor*

**[Instructions to the contract compiler: (delete this notes before issue to tenderers with an enquiry)**

Whenever a cell is shaded in the left hand column it denotes this data is optional. If not required select and delete the whole row, otherwise insert the required Data.]

#### Notes to a tendering contractor:

1. Please read both the NEC3 Engineering and Construction Contract (April 2013) and the relevant parts of its Guidance Notes (ECC3-GN)<sup>2</sup> in order to understand the implications of this Data which the tenderer is required to complete. An example of the completed Data is provided on pages 156 to 158 of the ECC3 (April 2013) Guidance Notes.
2. The number of the clause which requires the data is shown in the left hand column for each statement however other clauses may also use the same data
3. Where a form field like this [ ] appears, data is required to be inserted relevant to the option selected. Click on the form field **once** and type in the data. Otherwise complete by hand and in ink.

Completion of the data in full, according to Options chosen, is essential to create a complete contract.

Clause	Statement	Data
10.1	The <i>Contractor</i> is (Name): Address Tel No. Fax No.	
11.2(8)	The <i>direct fee percentage</i> is The <i>subcontracted fee percentage</i> is	% %
11.2(18)	The <i>working areas</i> are the Site and	
24.1	The <i>Contractor's</i> key persons are: 1 Name: Job: Responsibilities: Qualifications: Experience: 2 Name: Job Responsibilities: Qualifications: Experience:	

<sup>2</sup> Available from Engineering Contract Strategies Tel 011 803 3008, Fax 011 803 3009 or see [www.ecs.co.za](http://www.ecs.co.za)

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		CV's (and further key persons data including CVs) are appended to Tender Schedule entitled _____.		
11.2(3)	The <i>completion date</i> for the whole of the works is			
11.2(14)	The following matters will be included in the Risk Register			
11.2(19)	The Works Information for the <i>Contractor's</i> design is in:			
31.1	The programme identified in the Contract Data is			
<b>A</b>	<b>Priced contract with activity schedule</b>			
11.2(20)	The <i>activity schedule</i> is in	<b>(in figures)</b>  <b>(in words), excluding VAT</b>		
11.2(30)	The tendered total of the Prices is			
	<b>Data for Schedules of Cost Components</b>	Note "SCC" means Schedule of Cost Components starting on page 60, and "SSCC" means Shorter Schedule of Cost Components starting on page 63 of ECC3 (April 2013).		
<b>A</b>	<b>Priced contract with activity schedule</b>	<b>Data for the Shorter Schedule of Cost Components</b>		
	The percentage for adjustment for Equipment in the published list is	<b>Minus        %</b>		
22 in SSCC	The rates of other Equipment are:	<b>Equipment</b>	<b>Size or capacity</b>	<b>Rate</b>
61 in SSCC	The hourly rates for Defined Cost of design outside the Working Areas are  <b>Note: Hourly rates are estimated 'cost to company of the employee' and not selling rates.</b>  <b>Please insert another schedule if foreign resources may also be used</b>	<b>Category of employee</b>		<b>Hourly rate</b>
62 in SSCC	The percentage for design overheads is	<b>%</b>		

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63 in SSCC	The categories of design employees whose travelling expenses to and from the Working Areas are included in Defined Cost are:			
21 in SSCC	The published list of Equipment is the last edition of the list published by  The percentage for adjustment for Equipment in the published list is	%		
22 in SSCC	The rates of other Equipment are:	<b>Equipment</b>	<b>Size or capacity</b>	<b>Rate</b>

## C1.3 Forms of Securities

### Pro formas for Bonds & Guarantees

For use with the NEC3 Engineering & Construction Contract (June 2005)

**[Note to contract compiler:**

**Once it has been decided which securities are required for this contract delete from this file the ones not required, revise the notes below accordingly and delete this note.]**

The *conditions of contract* stated in the Contract Data Part 1 include the following Secondary Options:

Option X4: Parent company guarantee  
Option X13: Performance Bond  
Option X14: Advanced payment to the *Contractor*

Each of these secondary Options requires a bond or guarantee "in the form set out in the Works Information". Pro forma documents for these bonds and guarantees are provided here for convenience but are to be treated as part of the Works Information.

Option X16: Retention (not used with Option F)

The *Contractor* may provide a Retention Money Guarantee in the form stated here. When the *Employer* receives and accepts a Retention Money Guarantee exactly in the form stated he will instruct the *Project Manager* not to assess any amount be retained in terms of secondary Option X16.

The *Contractor* shall guarantee his ASGI-SA Obligations by providing the *Employer* with an ASGI-SA Guarantee in the form provided here.

**[Note to contract compiler: If there are no ASGI-SA Obligations in this contract, delete the above statement]**

The organisation providing the bond / guarantee does so by copying the pro forma document onto his letterhead without any change to the text or format and completing the required details. The completed document is then given to the *Employer* within the time stated in the contract.

**Duvha Upgrade of outside plant control room HMI****Pro forma Parent Company Guarantee (for use with Option X4)***(to be reproduced exactly as shown below on the letterhead of the Contractor's Parent Company)*

**Eskom Holdings SOC Ltd  
Megawatt Park  
Maxwell Drive  
Sandton  
Johannesburg**

Date:

Dear Sirs,

**Parent Company Guarantee for Contract No**

With reference to the above numbered contract made or to be made between

**Eskom Holdings SOC Ltd**(the *Employer*) and**{Insert registered name and address of the *Contractor*}**(the *Contractor*), for**{Insert details of the *works* from the Contract Data}**(the *works*).

I/We the undersigned

on behalf of the *Contractor's*  
parent company

of physical address

and duly authorised thereto do hereby unconditionally guarantee to the *Employer* that the *Contractor* shall Provide the Works in accordance with the above numbered Contract.

1. If for any reason the *Contractor* fails to Provide the Works, we hereby agree to cause to Provide the Works at no additional cost to the *Employer*.
2. If we fail to comply with the terms of this Deed of Guarantee, the *Employer* may itself procure such performance (whether or not the Agreement be formally determined). The *Employer* is to notify us and we shall indemnify the *Employer* for any additional cost or expense it incurs.
3. Our liability shall be as primary obligor and not merely as surety and shall not be impaired or discharged by reason of any arrangement or change in relationship made between the *Contractor* and the *Employer* and/or between us and *Contractor*; nor any alteration in the obligations undertaken by the *Contractor* or in the terms of the Agreement; nor any indulgence, failure, delay by you as to any matter; nor any dissolution or liquidation or such other analogous event of the *Contractor*.
4. The *Employer* shall not be obliged before taking steps to enforce the terms of this Deed of Guarantee to obtain judgement against the *Contractor* in any court or other tribunal, to make or file any claim in liquidation (or analogous proceedings) or to seek any remedy or proceed first against the *Contractor*.
5. This Deed of Guarantee shall be governed by and construed in accordance with the laws of the Republic of South Africa and we hereby submit to the non-exclusive jurisdiction of the High Court of South Africa.

Signed at \_\_\_\_\_ on this \_\_\_\_\_ day of \_\_\_\_\_ 200\_

Signature(s)	
Name(s) (printed)	
Position in parent company	
Signature of Witness(s)	
Name(s) (printed)	

**Duvha Upgrade of outside plant control room HMI****Pro forma Performance Bond – Demand Guarantee (for use with Option X13)***(to be reproduced exactly as shown below on the letterhead of the Contractor's Parent Company)*

**Eskom Holdings SOC Ltd**  
**Megawatt Park**  
**Maxwell Drive**  
**Sandton**  
**Johannesburg**

Date:

Dear Sirs

Reference No. [●] *[Drafting Note: Bank reference number to be inserted]***Performance Bond – Demand Guarantee:** *[Drafting Note: Name of Contractor to be inserted]*Project [ ] Contract Reference: ..... *[Drafting Note: Contractor contract reference number to be inserted]*

1. In this Guarantee the following words and expressions shall have the following meanings:-
  - 1.1 “Bank” - means [●], [●] Branch, (Registration No. [●]); *[Drafting Note: Name of Bank to be inserted]*
  - 1.2 “Bank’s Address” - means [●]; *[Drafting Note: Bank’s physical address to be inserted]*
  - 1.3 “Contract” – means the written agreement relating to the Project, entered into between Eskom and the Contractor, on or about the [●] day of [●] 200[●] (Contract Reference No. [.]as amended, varied, restated, novated or substituted from time to time; *[Drafting Note: Signature Date and Contract reference number to be inserted]*
  - 1.4 “Contractor” – means [●] a company registered in accordance with the laws of [●] under Registration Number [●]. *[Drafting Note: Name and details of Contractor to be inserted]*
  - 1.5 “Eskom” - means Eskom Holdings SOC Ltd, a company registered in accordance with the laws of the Republic of South Africa under Registration Number 2002/015527/30].
  - 1.6 “Expiry Date” - means the date on which the Defects Certificate is issued in terms of the Contract.
  - 1.7 “Guaranteed Sum” - means the sum of R [●] ([●] Rand);
  - 1.8 “Project” - means [insert if applicable.].
2. At the instance of the Contractor, we the undersigned \_\_\_\_\_ and \_\_\_\_\_, in our respective capacities as \_\_\_\_\_ and \_\_\_\_\_ of the Bank, and duly authorized thereto, confirm that we hold the Guaranteed Sum at the disposal of Eskom, as security for the proper performance by the Contractor of all of its obligations in terms of and arising from the Contract and hereby undertake to pay to Eskom, on written demand from Eskom received prior to the Expiry Date, any sum or sums not exceeding in total the Guaranteed Sum.
3. A demand for payment under this guarantee shall be made in writing at the Bank's address and shall:
  - 3.1 be signed on behalf of Eskom by a Group Executive, Divisional Executive, Senior General Manager, General Manager or its delegate;
  - 3.2 state the amount claimed (“the Demand Amount”);
  - 3.3 state that the Demand Amount is payable to Eskom in the circumstances contemplated in the Contract.



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4. Notwithstanding the reference herein to the Contract the liability of the Bank in terms hereof is as principal and not as surety and the Bank's obligation/s to make payment:
- 4.1 is and shall be absolute provided demand is made in terms of this bond in all circumstances; and
- 4.2 is not, and shall not be construed to be, accessory or collateral on any basis whatsoever.
5. The Bank's obligations in terms of this Guarantee:
- 5.1 shall be restricted to the payment of money only and shall be limited to the maximum of the Guaranteed Sum; and
- 5.2 shall not be discharged and compliance with any demand for payment received by the Bank in terms hereof shall not be delayed, by the fact that a dispute may exist between Eskom and the Contractor.
6. Eskom shall be entitled to arrange its affairs with the Contractor in any manner which it sees fit, without advising us and without affecting our liability under this Guarantee. This includes, without limitation, any extensions, indulgences, release or compromise granted to the Contractor or any variation under or to the Contract.
7. Should Eskom cede its rights against the Contractor to a third party where such cession is permitted under the Contract, then Eskom shall be entitled to cede to such third party the rights of Eskom under this Guarantee on written notification to the Bank of such cession.
8. This Guarantee:
- 8.1 shall expire on the Expiry Date until which time it is irrevocable;
- 8.2 is, save as provided for in 7 above, personal to Eskom and is neither negotiable nor transferable;
- 8.3 shall be returned to the Bank upon the earlier of payment of the full Guaranteed Sum or expiry hereof;
- 8.4 shall be regarded as a liquid document for the purpose of obtaining a court order; and
- 8.5 shall be governed by and construed in accordance with the law of the Republic of South Africa and shall be subject to the jurisdiction of the Courts of the Republic of South Africa.
- 8.6 Any claim which arises or demand for payment received after expiry date will be invalid and unenforceable.
9. The Bank chooses domicilium citandi et executandi for all purposes in connection with this Guarantee at the Bank's Address.

Signed at \_\_\_\_\_

Date \_\_\_\_\_

For and behalf of the Bank

Bank Signatory: \_\_\_\_\_

Bank Signatory: \_\_\_\_\_

Witness: \_\_\_\_\_

Witness: \_\_\_\_\_

Bank's seal or stamp

**PART 2: PRICING DATA**  
**ECC3 Option A**

Document reference	Title	No of pages
C2.1	Pricing assumptions: Option A	
C2.2	The <i>activity schedule</i>	

## C2.1 Pricing assumptions: Option A

### How work is priced and assessed for payment

Clause 11 in NEC3 Engineering and Construction Contract, (ECC3) Option A states:

<b>Identified and defined terms</b>	11	
	11.2	(20) The Activity Schedule is the <i>activity schedule</i> unless later changed in accordance with this contract.

(27) The Price for Work Done to Date is the total of the Prices for

- each group of completed activities and
- each completed activity which is not in a group.

A completed activity is one which is without Defects which would either delay or be covered by immediately following work.

(30) The Prices are the lump sum prices for each of the activities on the Activity Schedule unless later changed in accordance with this contract.

This confirms that Option A is a lump sum form of contract where the work is broken down into activities, each of which is priced by the tendering contractor as a lump sum. Only completed activities are assessed for payment at each assessment date; no part payment is made if the activity is not completed by the assessment date.

### Function of the Activity Schedule

Clause 54.1 in Option A states: "Information in the Activity Schedule is not Works Information or Site Information". This confirms that specifications and descriptions of the work or any constraints on how it is to be done are not included in the Activity Schedule but in the Works Information. This is further confirmed by Clause 20.1 which states, "The *Contractor* Provides the Works in accordance with the Works Information". Hence the *Contractor* does **not** Provide the Works in accordance with the Activity Schedule. The Activity Schedule is only a pricing document.

### Link to the programme

Clause 31.4 states that "The *Contractor* provides information which shows how each activity on the Activity Schedule relates to the operations on each programme which he submits for acceptance". Ideally the tendering contractor will develop a high level programme first then resource each activity and thus arrive at the lump sum price for that activity both of which can be entered into the *activity schedule*.

### Preparing the *activity schedule*

Generally it is the tendering contractor who prepares the *activity schedule* by breaking down the work described within the Works Information into suitable activities which can be well defined, shown on a programme and priced as a lump sum.

The *Employer*, in his Instructions to Tenderers or in a Tender Schedule, may have listed some items that he requires the *Contractor* to include in his *activity schedule* and be priced accordingly.

It is assumed that in preparing his *activity schedule* the *Contractor*:

- Has taken account of the guidance given in the ECC3 Guidance Notes pages 19 and 20;
- Understands the function of the Activity Schedule and how work is priced and paid for;

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- Is aware of the need to link the Activity Schedule to activities shown on his programme;
- Has listed and priced activities in the *activity schedule* which are inclusive of everything necessary and incidental to Providing the Works in accordance with the Works Information, as it was at the time of tender, as well as correct any Defects not caused by an *Employer's* risk;
- Has priced work he decides not to show as a separate activity within the Prices of other listed activities in order to fulfil the obligation to complete the *works* for the tendered total of the Prices.
- Understands there is no adjustment to the lump sum Activity Schedule price if the amount, or quantity, of work within that activity later turns out to be different to that which the *Contractor* estimated at time of tender. The only basis for a change to the Prices is as a result of a compensation event.

An activity schedule could have the following format:

Item No.	Programme Reference	Activity description	Price

## C2.2 the *activity schedule*

### The Prices List

Item no.	Description	Quantity	Rate	Price
	Duvha Water Treatment Plant Human Machine Interface (WTP HMI) – Heating, Ventilation and Air Conditioning Upgrade (HVAC) – (Supply, install and commission of all the equipment specified in the work information)		1	
<b>1</b>	<b>HVAC Related Electrical Works Schedule</b>			
	Plant and material selection; installation and as built drawings; Testing, balancing and commissioning Documentation; Operating Instruction and Maintenance Manuals; and Inspection Record Cards/Checklists.			
	Supply and install 400/380V AC HVAC Electrical Distribution Panels with circuit breakers, contactors, isolators, indication lamps, pushbuttons, door interlocking handles, ammeters, selector switch, auto/manual etc.			
	Supply, install and terminate power cables on the new 400/380V AC HVAC Electrical Distribution Panels.			
	Allocate the spare circuits on the selected boards to supply the new 400/380V HVAC Electrical Distribution Panels. Modify existing circuit if necessary.			
	Terminate the power cables on the allocated spare circuits on the selected boards to supply the new 400/380V AC HVAC Electrical Distribution Panels.			
	Electrical cable / wiring, Cable ladders and trays, power and control cabling and racking, joint kits, earthing, hangers and mounting arms, risers and droppers measured as elbows etc. and isolators ending within to HVAC equipment and its controls.			
	Testing and commissioning HVAC related electrical works			
<b>2</b>	<b>Cable, Racking and Routing</b>			
	Design, manufacture/procurement, transport, supply, install, test and commission the new cables.			
	Ensure interfacing with all the other system			

	requirements of the plant/installation.			
	Ensure that the <i>works</i> are implemented as prescribed in the corresponding standards			
	Test all cables and provided certificate.			
	Develop, finalise and implement the optimised cable routing.			
	Produce exact cable routing designs of all the cables.			
	Cater for cable servitudes and cable racking.			
	Implement all cable routing designs as approved.			
	Implement all cable terminations.			
	Produce all documentation and drawings			
<b>3</b>	<b>Earthing and Lightning protection</b>			
	Perform earth resistance and earth continuity tests of the existing earthing system to determine the status of the earthing point used.			
	Construct new earthing tied into the existing earth mat			
	Propose and implement lightning protection interventions.			
	Perform detailed designs, manufacture/procure, transport, supply, install, test and commission the earthing and lighting protection system and its components, in line with the relevant standards.			
	Provide all equipment and components required.			
	Ensure that interfacing with all the other system requirements of the plant/installation.			
	Produce all documentation and drawings.			
<b>4</b>	<b>HVAC Related Controls and Fire Detection Works Schedule</b>			
	Detailed Design of HVAC standalone equipment controls including plant and material selection; installation and as built drawings; Testing, balancing and commissioning Documentation; Operating Instruction and Maintenance Manuals; and Inspection Record Cards/Checklists.			
	Fire signal within 2.0m of HVAC equipment and electrical boards			
	Provision and connection of fire relay in HVAC			

	equipment and electrical boards			
	Testing and commissioning of HVAC related fire detection works			
<b>5</b>	<b>Civil and Building Works Design</b>			
	Two plinths are designed to support the HVAC equipment and HVAC distribution board.			
	The Fencing and access gate around the HVAC distribution board and control panel			
	HVAC distribution board and control panel is sheltered to protect the electrical equipment			
<b>6</b>	Health and safety	1		
<b>7</b>	Scaffolding	1		
<b>8</b>	Project management, quality assurance and control	1		
<b>9</b>	Site Establishment	1		
<b>10</b>	Site De-establishment	1		
<b>TOTAL TENDERED AMOUNT (Excluding VAT)</b>				

### Summary


<b>Document reference</b>	<b>Title</b>	<b>No of pages</b>
	This cover page	1
C3.1	<i>Employer's Works Information</i>	40
C3.2	<i>Contractor's Works Information</i>	1
	Total number of pages	42



## C3.1: EMPLOYER'S WORKS INFORMATION

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## 1. Description of the works

### 1.1 Executive overview

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

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

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

High level scope of the Works:

- (1) Engineering, design, procurement, manufacturing, factory acceptance testing, delivery, off-loading at site, storage, installation, testing, commissioning, and as-built documentation for the Duvha outside plant Human Machine Interface (HMI).
- (2) The specific sub-systems provided as part of Duvha outside plant HMI System include – but are not limited to the following:
  - i. Location in Water treatment plant server room for HMI hardware
  - ii. Existing interface to L2 connected plant via Profinet enabled gateway
  - iii. Fibre link to site historian from WTP server room
  - iv. Redundant power supply to server room
- (3) The specific sub-systems to be provided as part of the Duvha HMI system include – but are not limited to the following:
  - i. HMI system with 2 quad view operator stations extended via KVM.
  - ii. Engineering system
  - iii. Profinet control network for HMI
  - iv. GPS Time sync system

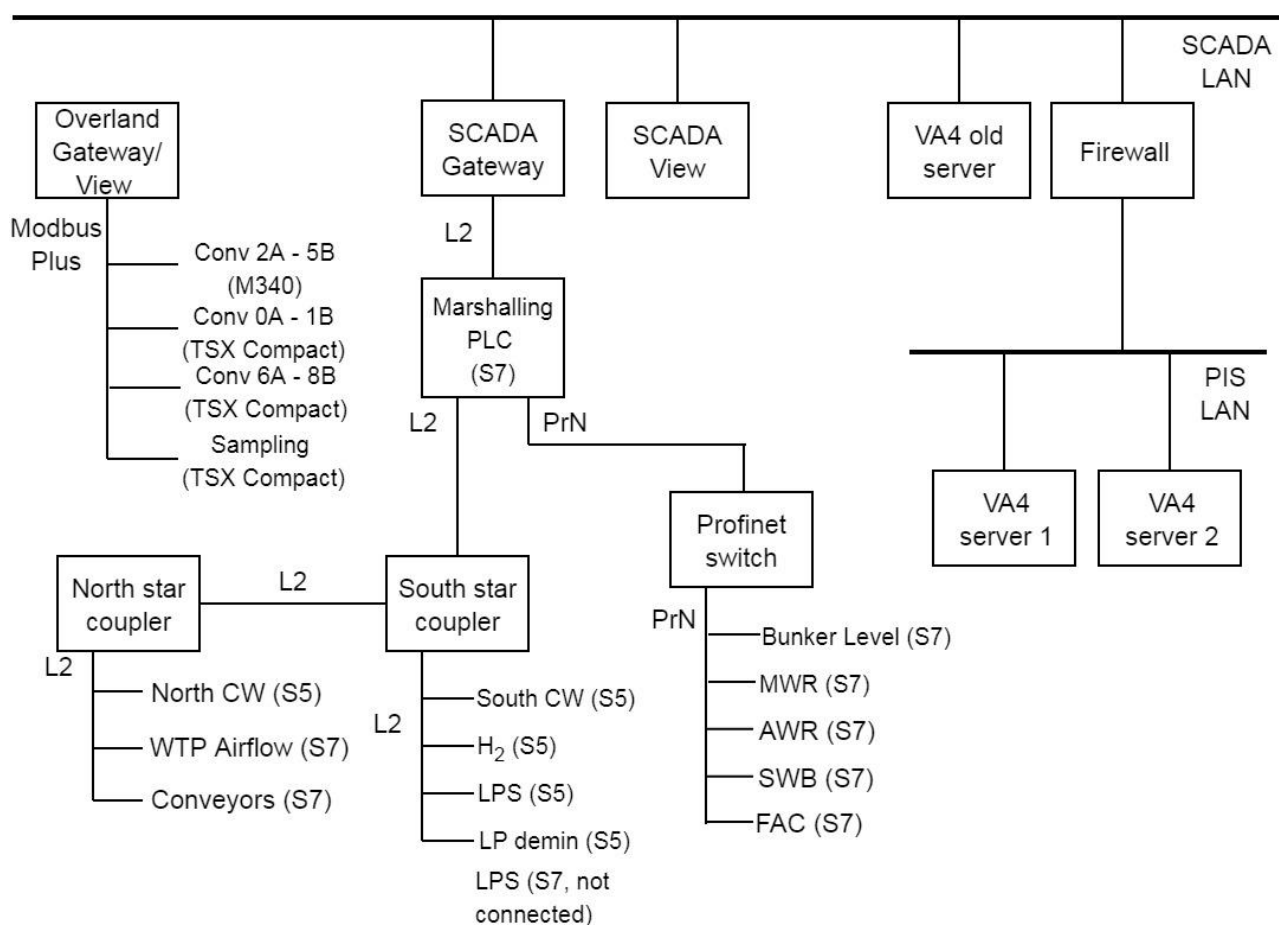
- v. Backup & recovery system
  - vi. Electronic security perimeter
  - vii. Power distribution systems
  - viii. OPC connection to site historian
- (4) Removal and/or relocation of existing equipment where required by new design
  - (5) Plant and labelling of all equipment supplied as part of the works
  - (6) Earthing of all equipment supplied as part of the works
  - (7) Training of Operating, Engineering & Maintenance staff
  - (8) All activities, services or equipment specified (special tools, consumables, etc.)
  - (9) All software, license and copyright agreements for the works.

## **1.2 Employer's objectives and purpose of the works**

### **1.2.1 Background**

- (1) The Human-Machine Interface (HMI) of the outside plant Supervisory Control and Data Acquisition (SCADA) system performs two main functions – that of displaying data relating to the operation of the outside plant equipment to the operators, as well as the forwarding of this data to the station historian.
- (2) The system as currently installed comprises of:
  - i. 15 x S5 PLCs (all on L2 network)
  - ii. 16 x S7 PLCs, (2 on L2 network, 10 on Profinet network, 4 not connected)
  - iii. S7 marshalling PLC to condense data on L2 network and Profinet.
  - iv. Outside plant SCADA system (iFix v2.5 on Windows NT)
  - v. 13 x Modicon TSX Compact PLCs
  - vi. 6 x Schneider M340 PLCs
  - vii. Overland conveyor SCADA system (Wonderware on Windows XP)
  - viii. Interface to PIS network and site historian.
- (3) The Outside Plant SCADA is a network of Siemens S5 and S7 PLCs responsible for monitoring of Outside Plant equipment. All of the PLCs communicate with an S7-400 marshalling PLC located at LP services via L2 FDL serial communication and Profinet Ethernet communication. The North and South CW, H2 and LPS plants are connected to the marshalling PLC via L2 FDL. The Bunker, MWR, AWR, SWB and FAC PLCs are connected to the marshalling PLC via Profinet. The marshalling PLC reduces the amount of communication packets on the bus by concentrating the data from the plants from 27 communication packets down to 9 packets. The link between the marshalling PLC and the SCADA Gateway machine uses L2 FDL.
- (4) The SCADA gateway computer is connected to the marshalling PLC via a specialised L2 interface card. A quad-monitor View computer is used to display data captured by the Gateway on process graphics. The View and Gateway computers together form the Human Machine Interface. Intellution iFix v2.5 is used to provide the process graphics and alarm system and is currently installed on Windows NT.

- (5) The Gateway computer also feeds data to the Process Information System (PIS), over the Process Network. This connection utilises a custom written software driver, provided by the PIS vendor.
- (6) The Outside plant control room further houses SCADA equipment for the Overland conveyor system. The HMI for this separate system is implemented using a single computer, which performs both Gateway and View functions. A ModbusPlus serial card is installed in the computer, which allows communication to the Schneider PLCs located in the Overland and Staithe Substations. Wonderware software running on Microsoft Windows XP is used to display information regarding the conveyors to the operator, as well as to input commands to the PLCs.
- (7) The technologies used in the outside plant SCADA HMI have passed their usable lifetime, and issues relating to the procurement of spares and the availability of maintenance skills have been increasing steadily. It has therefore been decided to replace the HMI system with a state-of-the-art industry-standard equivalent. Not only will this upgrade mitigate the existing risks associated with obsolescence, but also provide additional functionality for example remote operations which was not available when the HMI was originally installed.
- (8) The S5 and TSX Compact PLCs are obsolete. The S7 and M340 PLCs are still supported by their respective manufacturer.
- (9) The outside plant system is presented below.



**Figure 1: Outside plant as-is**

### 1.2.2 Purpose of the works

- (1) The following are the main objectives of the *works*:
- i. Installation of new outside plant HMI system
  - ii. Migrating existing graphics and control schemes to new HMI
  - iii. Establish new ProfiNet based network segment
  - iv. Integrating overland conveyor system into outside plant HMI
  - v. Integrated engineering system for outside plant
- (2) Obsolescence risk of HMI on outside plant to be eliminated.

### 1.3 Interpretation and terminology

The following abbreviations are used in this Works Information:

Abbreviation	Meaning given to the abbreviation
AWR	Ash water return
AC	Alternating Current
AFC	Approved for construction
BMS	Building Management System
C&I	Control and Instrumentation
CA	Corrective Action
CW	Cooling water
DB	Distribution box
Demin	Demineralised water
DX	Direct Expansion
FAC	Forced air compressor
GPS	Global Positioning System
H <sub>2</sub>	Hydrogen
HMI	Human Machine Interface
HVAC	Heating Ventilation and Air Conditioning
ISO	International Organisation for Standardisation
KVM	Keyboard, video and mouse
LOSS	Limits of Service and Supply
LPS	Low Pressure Services
MAC	Media access control
MTTF	Mean Time To Failure
MTTR	Mean Time To Repair

MWR	Mine water return
NTP	Network time protocol
OBL	Outside battery limits
OEM	Original Equipment Manufacturer
OPCR	Outside plant control room
OT	Operation Technology
PIS	Process information system
PLC	Programmable logic controller
QA	Quality Assurance
QC	Quality Control
QCP	Quality Control Procedure
RCM	Reliable Centre Maintenance
SANS	South African National Standards
SCADA	Supervisory control and data acquisition
SE	System Engineer
SWB	Sluice water booster
VDSS	Vendor Document Supplier Submittals
WTP	Water treatment plant

The following definitions are used in this Works Information:

Definition	Description
Acceptance	The Employer accept the condition or design but does not take responsibility from the Contractor
Approval	Written agreement or authorization by Employer. All requests for approval must be submitted in writing and any proposed deviation from specified requirements must be fully justified and agreed by Employer.
Central Update System	The system used to deploy, manage and control the application of security patches, antivirus updates and antivirus signature files to the individual computers, network switches and UTMs of the Duvha C&I system.
Contractor	Refers to the corporation appointed to perform the engineering, procurement, and construction works required for the project.
Design freeze	Is a binding decision that defines the whole product, its parts or parameters and allows the continuation of the design based on that decision (no further changes can be made to the design, it is cut-off for the engineers)
Employer	Refers to Eskom Holdings State Owned Company
Eskom Plant Engineering	Refers to the Eskom Engineering team who will perform the reviews and provide technical assistance for the work performed by the appointed Contractor.
Heating, Ventilating, and Air Conditioning (HVAC)	Relates to systems that perform processes designed to regulate the air conditions within buildings for the comfort and safety of occupants. HVAC systems condition and move air to desired areas of an indoor environment to create and maintain desirable temperature, humidity, ventilation and air purity.

Definition	Description
Integrated engineering system	An engineering system capable interface with the PLCs over the Profinet communications network to perform remote maintenance and configuration. An engineering system must either be integrated with the HMI, or be able to provide forward engineering capabilities to the HMI, eg automatic tag generation from PLC source code
Interface	Interface in this document means either to hard wired or software interaction between the Contractors and/or other Works
Maintenance	Maintenance can be defined as the function of keeping components or equipment in, or restoring them to a serviceable condition so that they comply with design and statutory requirements and employer standards. Maintenance includes the cleaning, removal of contaminants and waste, correct adjustment and setting, tightening, testing, fixing, refill, lubrication, rust prevention, touch up, refrigeration charge, servicing, inspection, replacement, re-installation, troubleshooting, calibration, condition determination, repair, modification, overhaul and rebuilding of equipment. Maintenance can be either preventative or corrective of nature.
Maintenance Management	Maintenance Management can be described as the management (planning, organising, leading and control) actions needed to ensure effective maintenance execution to provide the most efficient and optimum availability (capable of being used) and reliability (consistent quality) of the equipment installed.
Owners Engineer	Owners Engineer - When Eskom acts as the Owners Engineer on a project/package/plant/system/asset, the reviewer(s) are to review the design documentation issued by the Design Authority to ensure that: the design satisfies the stakeholder requirements (i.e. validation of design deliverables against stakeholder requirements). General technical oversight is provided over the design.
Specification	The document/s forming part of the contract in which the methods of executing the various items of work to be done is described, as well as the nature and quality of the materials to be supplied and it includes technical schedules and drawings attached thereto as well as all samples and patterns
The Client	The end user will be Eskom who will be represented by client throughout the duration of the Project.

## 2. Management and start up.

### 1.1 Management meetings

- (1) Regular meetings of a general nature may be convened and chaired by the *Project Manager* as follows:

Title and purpose	Approximate time & interval	Location	Attendance by:
Risk register and compensation events	Weekly on Mondays at 13h00	Projects/ WTP Boardroom	Employer, <i>Contractor</i> , Supervisor
Overall contract progress and feedback	Monthly on Thursdays at 13h00	Projects/ WTP Boardroom	Employer, <i>Contractor</i> , Supervisor
Monthly Safety meeting, weekly during implementation	Monthly on Mondays at 14h00	Projects/ WTP Boardroom	Employer, <i>Contractor</i> , Supervisor, Safety Officers
Quality and NCR/Defect/Concessions meeting	Monthly on Mondays at 15h00	Projects/ WTP Boardroom	Employer, <i>Contractor</i> , Supervisor, Quality managers and Officers
Weekly contract progress	Weekly on Mondays at	Projects/ WTP	Employer, <i>Contractor</i> ,



and feedback	08h00	Boardroom	Supervisor, Quality managers
Daily contract progress and feedback	Daily at 09h00	Projects/ WTP Boardroom	Employer, <i>Contractor</i> , Supervisor, Quality managers

- (2) Meetings of a specialist nature may be convened as specified elsewhere in this Works Information or if not so specified by persons and at times and locations to suit the Parties, the nature and the progress of the works.
- (3) Records of these meetings shall be submitted to the Project Manager by the person convening the meeting within five days of the meeting.
- (4) All meetings shall be recorded using minutes or a register prepared and circulated by the person who convened the meeting.
- (5) Such minutes or register shall not be used for the purpose of confirming actions or instructions under the contract as these shall be done separately by the person identified in the conditions of contract to carry out such actions or instructions.
- (6) Meetings of a specialist nature may be convened as specified elsewhere in this Works Information or if not so specified by persons and at times and locations to suit the Parties, the nature and the progress of the works. Records of these meetings shall be submitted to the Project Manager by the person convening the meeting within five days of the meeting.
- (7) All meetings shall be recorded using minutes or a register prepared and circulated by the person who convened the meeting. Such minutes or register shall not be used for the purpose of confirming actions or instructions under the contract as these shall be done separately by the person identified in the conditions of contract to carry out such actions or instructions.

## 2.1 Documentation control

- (1) All formal communication between the Employer and the Contractor shall take place through the Employer's Buyer
- (2) All formal communication shall be marked with the date and a reference code in the form DVP-XXX-nnn where:
  - i. XXX is the acronym of the *Contractor*
  - ii. nnn is the sequential number of the communication
- (3) All formal communication must be acknowledged by the recipient
- (4) The Contractor's site manager must keep a daily log, which needs to be signed by the Employer's Supervisor daily

## 2.2 Health and safety risk management

- (1) The Contractor's personnel is to undergo Safety Induction Training at Duvha prior to commencement of this contract and all the relevant Documentation is to be approved by Safety Officials and the Project Manager before any activities can be started on site.
- (2) The Contractor complies with the requirements of the Duvha Power Station Safety, Health & Environmental Specifications SAS 0012: Duvha Power Station Contractors safety manual

- (3) The documents are completed by the Contractor's and submitted to the Employer before taking possession of the works.
- (4) These documents are valid for the duration of the works.
- (5) The Contractor and all his personnel attend a Health and Safety Induction Course prior to starting with the works.
- (6) The induction course is presented by the Safety Risk Department at Duvha Power Station.
- (7) The Contractor makes arrangements with Safety Risk Management at telephone number 013-690-0143.
- (8) The Contractor submits all the documents as indicated in the Safety, Health & Environmental Specifications relevant to the work to Safety Risk Management before the induction course.
- (9) The Contractor completes all appointments required and ensures that the appointee and appointees fully understand their responsibilities and are competent and trained to execute their duties.
- (10) The appointees/appointee ensures that all duties are carried out and records are kept by the Contractor for review/audit by the Employer or Inspector of Machinery.
- (11) Management has the right and authority to visit and inspect the Contractor's work place or Site establishment.
- (12) The Contractor supplies and ensures that his employees wear the necessary PPE according the risk assessments performed on the specific tasks to be carried out.
- (13) The Contractor ensures that everyone entering Duvha Power Station under his supervision is medically, physically and psychologically fit to enter Duvha Power Station.
- (14) The medical examination, at the Contractor's cost, is carried out by a Registered Professional Occupational Health Practitioner and the examination shall include the following tests:
  - i. Eye Test, Blood Pressure,
  - ii. Heart Function,
  - iii. Hearing Test and
  - iv. Lung Function.
- (15) A thorough examination is done and previous physical injuries, as well as occupational diseases/complications are covered.
- (16) If at any point in time during the execution of the works, the Contractor has a radiation-related incident/exposure, the onus is on the Contractor to immediately notify the Employer, the Medical Station, the Risk Manager and the Safety Risk Management Department.
- (17) The onus thereafter is for the Contractor to immediately arrange, at his/her cost, for blood samples to be taken by a Registered Laboratory and for this sample to be sent to the Accelerator Laboratory in Cape Town for full radiation exposure tests. This test results are then to be discussed with the Duvha Occupational Health Practitioners, who will then advise the Power Station Management on the risk, if any, of the incident/exposure.
- (18) The Contractor takes full responsibility and accountability for all other people/staff/personnel/labour that he/she employs or utilises, whether in full-time/part-time/contract basis, in executing the works or other work whilst on the Employers premises.

- (19)The Contractor ensures that Safety Harnesses are used for all work carried out in elevated positions, as defined in the Occupational Health and Safety Act, No 85 of 1993 or any other Code of Practice or standard or the Construction Regulations.
- (20)All safety equipment or Machinery used complies with the SANS Codes of Quality and Practice or any Code as stipulated in the Occupational Health and Safety Act, No 85 of 1993, and any amendments thereto.
- (21)The Contractor at all times consider himself as “Employer” as defined in the Occupational Health and Safety Act, No 85 of 1993 and do not consider himself as under supervision or management of the Employer with regard to Health and Safety Requirements but only from a Commercial Contractual Condition of Contract. Under no circumstances does the Contractor consider himself a sub-ordinate or being given supervision.
- (22)The Contractor provides and maintains his own facilities as required in the Occupational Health and Safety Act, No 85 of 1993 or any other Code of Practice or standard or the Construction Regulations, if not agreed contractually or arranged by the Employer.
- (23)The Contractor has Safety Systems in place at his premises for the total contract period and these shall include the following:
  - (24)Safety Management Structure and Compliance to these
  - (25)Statutory Appointments
  - (26)Records and documentation of all Risk and Hazard Analyses.
  - (27)Planned Job Observations Records and Documents.
  - (28)Employment history and records of all personnel, part-time or full-time or contract labour.
  - (29) Medical History of all personnel, part-time or full-time or contract labour
  - (30)Training and Competency Records with regard to Safety, Health and Environment.
  - (31)Training and Competency Records with regard to the skills he uses to carry out the works or any other works in the Employers premises.
  - (32)Compensation Commissioner Records and proof of registration.
  - (33)Records and documentation with regard to any sub-Contractor or labour-only contracts he places or uses to carry out the works or any other works in Employers premises.
  - (34)Personal Protective Equipment and Safety Equipment Inspection, training and competency records and documentation.
  - (35)Employment contracts for all sub-Contractor or labour-only contracts.
  - (36)Compliance to a Safety System, such as NOSA or any other system that is similar in nature.
  - (37)Records of all incidents or accidents, and vehicle accidents, incurred during execution of this works or any other works in the Employers premises.
  - (38)Records of all man-hours, including sub-Contractors or labour-only contracts, the Contractor spends on the Employers premises.
  - (39)Written Safe Work Procedures for all hazardous tasks the Contractor executes on the Employers premises.
  - (40)A Fall Protection Plan for all elevated work the Contractor does on the Employers premises.
  - (41)Environmental plan and awareness training.

- (42) Induction training records of his staff by himself/herself.
- (43) Minimum wage compliance for the different skills and to which Bargaining Council compliance is made to and proof of membership, if any.
- (44) Risk Assessment of this type of works:
- (45) Risk Assessment to be completed by a team consisting of Contractor and Employer personnel,
- (46) Proof of authorisation/accreditation from Department of Labour and or other Statutory Body for this type of works, if applicable
- (47) Emergency Evacuation and Rescue Plan for the hazardous tasks related to the works.
- (48) The Contractor shall appoint a person, qualified and competent in accordance with the SHEQ requirements, as the liaison with the Eskom safety officer/delegated person for all matters related to health and safety, this person is contactable 24 hours a day.
- (49) The Contractor shall comply with the following:
  - v. Form 74 – SHE specification.
  - vi. Eskom Safety, Health, Environmental and Quality Policy: 32-727
  - vii. Eskom Life Saving Rules, Directive: 32-421
  - viii. Eskom Procedure on Smoking: 32-36
  - ix. Eskom Incident Management Procedure 32-95 Rev 3
  - x. Eskom Plant safety regulations 36-681.
  - xi. Eskom Integrated Risk management and Standards 32-391
  - xii. PGZ 45-24 HAZOP study guidelines
  - xiii. Eskom Standard SAS0012 Safety, Health & Environmental Specifications For *Contractors*
- (50) The Contractor shall comply with the health and safety requirements contained in this Works Information.

## 2.3 Environmental constraints and management

- (1) The Contractor shall comply with Eskom Duvha Waste Procedure ENVP0005.
- (2) The Contractor is responsible to keep the work area clean of any rubble.
- (3) The Employer will provide special colour coded bins for refuse disposal. The Employer will empty these bins.
- (4) The Contractor ensures that all workers under his control strictly adhere to the correct use of refuse bins. Refer to Duvha Waste Procedure ENVP0005 for refuse bin colour coding.
- (5) For the full duration of the Works, the Contractor is responsible to keep the work area clean of any rubble, and to place all refuse into the bins provided.
- (6) Removal of scrap and waste, including concrete/ash/refractory material to a location within the Duvha Power Station security gates and/or the ash dams must be included in the Price Schedule or Bill of Quantities. This must be inclusive of labour and equipment i.e. forklifts spades, shovels, transport.

## 2.4 Quality assurance requirements

- (1) All work is carried out under the supervision of an experienced supervisor.
- (2) The Contractor complies with the Employer's Quality Requirements as specified in Eskom Generation Standard QM58.

- (3) All quality control documentation (QCP) is submitted to the Project Manager within 7 days of Contract date.

## 2.5 Programming constraints

- (1) The Contractor submits a programme within 1 week of the Contract Date.
- (2) The program shall be in Microsoft Projects format
- (3) The programme indicates
  - i. The hour duration of each activity,
  - ii. The working calendar (number of work hours per day, days per week),
  - iii. The exact quantity of people per day
  - iv. All phases and interfaces

## 2.6 Contractor's management, supervision and key people

- (1) The Contractor shall provide a site Supervisor or Project Manager to supervise, monitor, control and coordinate all activities during the execution of the works
- (2) Contractor shall also provide the following staff:
  - i. Quality control supervisor
  - ii. Site Safety representatives
  - iii. Design and Testing Engineer

## 2.7 Invoicing and payment

- (1) Within one week of receiving a payment certificate from the Project Manager in terms of core clause 51.1, the Contractor provides the Employer with a tax invoice showing the amount due for payment equal to that stated in the Project Manager's payment certificate.
- (2) The Contractor shall address the tax invoice to Eskom Holdings SOC Ltd and include on each invoice the following information:
  - i. Name and address of the *Contractor* and the Project Manager;
  - ii. The contract number and title;
  - iii. *Contractor's* VAT registration number;
  - iv. The Employer's VAT registration number 4740101508;
  - v. Description of service provided for each item invoiced based on the Price List;
  - vi. Total amount invoiced excluding VAT, the VAT and the invoiced amount including VAT;

## 2.8 Insurance provided by the *Employer*

- (1) Refer to the contract data.

## 2.9 Contract change management

- (1) The Contractor or the Project Manager formally notifies each other of any event which may lead to a change in agreed terms as per NEC 3.

## 2.10 Provision of bonds and guarantees

- (1) The form in which a bond or guarantee required by the conditions of contract (if any) is to be provided by the Contractor is given in Part 1 Agreements and Contract Data, document C1.3, Sureties.
- (2) The Employer may withhold payment of amounts due to the Contractor until the bond or guarantee required in terms of this contract has been received and accepted by the person notified to the Contractor by the Project Manager to receive and accept such bond or guarantee. Such withholding of payment due to the Contractor does not affect the Employer's right to termination stated in this contract.

## 2.11 Records of Defined Cost, payments & assessments of compensation events to be kept by the *Contractor*

- (1) The *Contractor* may keep records of payment and assessments of compensation events if deemed necessary.

## 2.12 Training workshops and technology transfer

### 2.12.1 General Requirements

- (1) The Contractor provides training on the equipment and systems included as part of the works to the various categories of the Employer's technical staff for the duration of the works.
- (2) All training provided by the Contractor is customised for Duvha Power Station and is directly applicable to the actual equipment and software supplied for the works.
- (3) Training is focused on the specific HMI and systems' architecture, configuration, layout, equipment, software, HMI and design that the Contractor provides for the works.
- (4) Generalised training based on the Contractor's generic control system architecture, HMI and design philosophies is not acceptable.
- (5) Training facilities for the Engineering and Maintenance are provided by the Contractor.
- (6) Training material and tools are not shared by trainees during the training
- (7) The training facilities provided are:
  - i. air-conditioned and suitably sized
  - ii. accommodates all trainees comfortably
  - iii. includes all engineering tools and workstations
- (8) The training is provided as per the detailed training programme and prospectus accepted by the Project Manager.
- (9) The training is completed before the start of FAT.

### 2.12.2 Training Categories

- (1) Practical hands-on training for each individual trainee forms an integral part of each of the courses in these categories:
  - i. Training of Engineering & Maintenance Staff
  - ii. Training of Operators
  - iii. The training must be done upfront before implementation. The elements of the training are described in the subsections below.

### 2.12.3 Upfront Training of Engineering & Maintenance Staff

- (1) Basic Engineering & maintenance training includes, as a minimum:
  - i. Usage of all sub-systems in the outside plant HMI system
  - ii. Familiarisation with the documentation forming part of the works, including drawing configuration logic
  - iii. Hardware familiarisation
  - iv. Hardware configuration which includes the computers, network modules and all other peripheral equipment supplied as part of the works.
  - v. Hardware installation
  - vi. HMI and C&I system software reloading
  - vii. Graphic display design, development and configuration
  - viii. Drawing and hardcopy report generation
  - ix. Network maintenance
  - x. Operator interface familiarisation including keyboard and display functions, controls, alarms and messages
  - xi. System maintenance through use and interpretation of diagnostic routines and error codes of on-line and off-line diagnostic software for the detection of faulty modules
  - xii. Outside plant HMI system hardware maintenance training including the computers, network and all other peripheral equipment supplied as part of the works.
  - xiii. Usage of Engineering workstations
  - xiv. Installation, configuration and maintenance of all software packages forming part of the works

### 2.12.4 Training of Operators

- (1) Operator training includes, as a minimum:
  - i. Familiarisation with the documentation provided as part of the works, including drawing configuration logic
  - ii. Graphic display, design and configuration
  - iii. Operator interface familiarisation including keyboard and display functions, plant control, plant monitoring, navigation, alarms, messages.
  - iv. Use of the HMI during emergency operations
  - v. Training of Operating Staff must take place at Duvha Power Station.

### 2.12.5 Trainee Participants

- (1) The total number of participants trained is as follows:
  - i. Basic Engineering & Maintenance : 20
  - ii. Operator : 12
- (2) The Employer bears the cost of salaries, accommodation, travelling expenses and other allowances of his personnel during the training, but all other training costs are borne by the Contractor.
- (3) The Contractor provides additional training courses as and when instructed by the Project Manager.

### 2.12.6 Training Documentation

- (1) The Contractor provides all course material including manuals.
- (2) The course material is in English and includes all third party documentation.
- (3) Printed and soft copies of the training documentation are supplied for each trainee plus an additional 3 hardcopy master sets and three soft copies.
- (4) All training documentation provided by the Contractor is customised for Duvha Power Station.

- (5) The training documentation contains the specific outside plant HMI and C&I systems' architecture, configuration, layout, software, equipment, HMI and design provided by the Contractor as part of the works.
- (6) Training manuals are continuously updated by the Contractor up to the date of issue of the Defects Certificate for the whole of the works.

## **2.13 Project Execution Methodology**

### **2.13.1 General Requirements**

- (1) The Contractor is responsible for carrying out all activities and supplying everything to provide the works.
- (2) This includes clarification and co-ordination with process plant engineers, other equipment manufacturers/suppliers and the Project Manager.
- (3) All documentation submitted by the Contractor is in an adequate state of completeness.

### **2.13.2 Engineering Design**

- (1) Engineering design is defined as being all activities required to translate the Contractor's scope of works, into a fully functional automation system
- (2) All Engineering design activities are executed by the Contractor in active co-operation with the Project Manager
- (3) The engineering design activities are phased to suit the Accepted Programme
- (4) A plant walk is performed including, but not limited to:
  - i. Verification of location and suitability of hardware installation points.
  - ii. Verification of location and suitability of cable routing paths.
  - iii. Contractor shall submit the Investigation findings to Eskom for review/comments.
- (5) As a minimum, Engineering design consists of the development, technical clarification and acceptance of the following:
  - i. Engineering programme
  - ii. Index and master register of documents
  - iii. Documentation synopsis
  - iv. OEM best practices
  - v. Cabinet Layout Diagrams
  - vi. Cable Routing Diagrams
  - vii. Cable & Termination schedules
  - viii. Engineering and maintenance procedures
  - ix. Network Topology Diagrams
  - x. Network installation philosophy
  - xi. Switch configuration diagrams
  - xii. Cabling concept
  - xiii. Power distribution philosophy
  - xiv. Integration test procedures
  - xv. Bill of Materials (make, model, rating, quantity etc...)
- (6) The Contractor and the OEM identify any discrepancies that would lead to shortcomings in the design and makes the Employer aware of such discrepancies and provides recommendations, where applicable. The Contractor takes action on such discrepancies.



### **2.13.3 Cyber Security**

- (1) The network, system and components to be designed in order to achieve the required goals must conform to the required standards.
- (2) Cyber Security for OT systems is governed by the standard 240-55410927: Cyber Security Standard for Operational Technology Revision 2.
- (3) The Contractor is responsible to ensure the design takes all the various aspects into consideration.
- (4) The Contractor is responsible for highlighting any deviation from the standard to the Employer during detailed design stage.
- (5) Any deviation must be approved and signed off by the Employer.
- (6) Should a deviation not have been highlighted by the Contractor, correcting such a deviation will be for the Contractor's cost.
- (7) Should a deviation not be approved, the design should be duly corrected by the Contractor to accommodate the required aspect.
- (8) The aspect of backup/restore and disaster recovery must be proven on the system.

### **2.13.4 Supply, Installation, Configuration and Testing**

#### **2.13.4.1 General**

- (1) This stage consists of the supply, installation, configuration and testing of all equipment forming part of the works as well as other items that the Employer has specified such as free issued items.
- (2) Erection and installation of the relevant equipment does not begin until the engineering documentation for the section of the plant concerned has been accepted by the Project Manager
- (3) Quality inspections and tests are carried out by the Contractor after erection to prove the compliance of the installation with the Works Information and the engineering design freeze documentation.
- (4) Erection and installation is only considered complete once the quality inspections and tests for the installation concerned have been accepted by the Project Manager
- (5) The Employer reserves the right to appoint representatives to inspect all parts during erection and to be present at any of the quality inspections and tests
- (6) The Project Manager is free to specify hold and witness points during the installation and testing stages of the project.
- (7) The Contractor gives fifteen working days advance notice to the Project Manager of holds and witness points.
- (8) The Contractor confirms hold and witness points at least seven working days prior to the test activity.
- (9) The Contractor provides all test equipment for any inspections and tests.

#### **2.13.4.2 Site Integration Test (SIT)**

- (1) The SIT only begins once the cabinets have been installed in the final location and connected to permanent power supplies
- (2) The SIT is carried out before plant commissioning commences to ensure:
  - i. Compliance with the Works Information and the engineering design freeze documentation

- (3) The Contractor prepares a detailed SIT procedure
- (4) As a minimum, the proposed SIT procedure identifies the following:
  - ii. Major test activities
  - iii. Comprehensive list and description of the individual tests to be performed
  - iv. How the tests are to be prepared and conducted
  - v. Test dates and durations
  - vi. Checklists - how the test results will be documented
  - vii. Acceptance Criteria
  - viii. How the identified discrepancies will be processed
  - ix. Retesting requirements
- (5) In the event of an error in any test (hardware or software) the fault is logged, analysed and resolved.
- (6) The Contractor is allowed to rectify the fault and retest for the full duration on condition that the Project Manager finds the fault to be minor.
- (7) Major faults such as incorrect configuration, lack of communication or major faults as determined by the Project Manager may lead to the termination of the SIT.
- (8) The Contractor rectifies the fault and re-starts the SIT after proving the compliance and performance of the rectified piece of equipment by carrying out the appropriate diagnostic tests.
- (9) A Final SIT Report is prepared by the Contractor that includes the following as a minimum:
  - x. Test procedures used during SIT
  - xi. Detailed Test results
  - xii. Discrepancies identified during the tests
  - xiii. Resolution of the discrepancies
  - xiv. Retests conducted and results thereof
  - xv. SIT certificate
- (10) The Contractor submits the Final SIT Report to the Project Manager for acceptance.
- (11) When all tests are successful and the Final SIT Report is accepted by the Project Manager, the system is classified as 'ready for use'. The system is then deemed ready for commissioning
- (12) The submission and update of all documentation shall comply with VGB R 171, 2nd edition, 2010.
- (13) SIT should not in any manner hinder or affect the running of the old HMI system.

## **2.13.5 Commissioning**

### **2.13.5.1 General**

- (1) Commissioning is defined as bringing into service all items of the works, and meeting the functional requirements and performance criteria of the Works Information.
- (2) Contractor shall submit the detailed commissioning test procedures to the Project Manager for approval.
- (3) Commissioning requires that the new HMI run in parallel to the old HMI.
- (4) Commissioning includes all testing and verification of the stated performance criteria with:
  - i. Works Information.
  - ii. The engineering design freeze documentation
- (5) The Contractor provides sufficient personnel for the satisfactory and timely commissioning of equipment
- (6) The Contractor co-operates fully with the Project Manager or Representative(s) in the commissioning.

- (7) The Contractor provides all the test equipment for the commissioning network equipment and infrastructure.
- (8) The Contractor certifies that equipment is in a suitable and safe condition for use before it is placed in service.
- (9) Commissioning also requires that the old HMI be removed from the CR while the new HMI is installed and as such will be time critical.
- (10) Change over from old to new HMI should happen as quickly as possible with minimal disruption to the operator.
- (11) The Contractor shall be fully involved in the Commissioning phase.

#### **2.13.6 “As Built” Documentation**

- (1) 'As Built' documentation is supplied by the Contractor to the Project Manager upon completion of works.
- (2) 2 hard copies and 2 soft copies of As Built documentation is provided by the Contractor as part of the works.
- (3) Acceptance of the 'As Built' documentation is a pre-requisite for the completion of the works
- (4) The documents are reviewed by the Project Manager for correctness and conformance to the accepted design.
- (5) Soft copies must be in Microsoft Office 2010 or higher format.
- (6) Drawings must be in Bentley Microstation or similar CAD format.

#### **2.13.7 Risks**

- (1) During the execution of the project, special caution should be taken as the Outside plant HMI oversees the monitoring of common plant for all operating units at Duvha Power Station.
- (2) Although the current system is decentralised control it is centralised monitoring and alarming.
- (3) As such, any work being executed should take into consideration of the operator's responsibility to monitor the plant.
- (4) Any and all risk during this project should be highlighted up front to the Employer and immediately should a new risk arise.

### 3. Engineering and the *Contractor's* design

#### 3.1 *Employer's* design

##### 3.1.1 Process, Operating and Control Description

- (1) The control room moves from pure monitoring functionality to monitoring and control.
- (2) The upgraded system must retain the functionality of the current system to monitor, alarm and control Outside Plant and Overland Conveyor processes.
- (3) The upgraded system should provide functions on one platform, implementing the SCADA functions for the Outside Plant and Overland Conveyor on a single system.
- (4) Improved viewing functionality of plant processes must be possible by adding more screens to the HMI.
- (5) Proper overview dictates 8 x 24 inch screens to be configured in 2 rows x 4 columns layout.

##### 3.1.2 System design

- (1) A separate point of access to the system should be provided to perform engineering changes and commissioning.
- (2) The system must have the possibility to add more signals, tags and alarms and upgrading the communication infrastructure needed to ensure easy integration of future projects.
- (3) The system must interface using OPC to the station historian for storage through redundant links.
- (4) All networking equipment should be tailored for industrial use.
- (5) Fibre optic cable will be 62.5/125 um multi-mode.
- (6) Redundant cable should not follow the same patch between.
- (7) All fibre patch panels and leads to utilise ST connectors

##### 3.1.3 System Specifics

- (1) All clients to utilise Windows 10 Professional, 64 bit
- (2) All servers to utilise at minimum Windows Server 2016, 64 bit
- (3) All clients and servers to be in line with current installed base.

### 3.2 Parts of the *works* which the *Contractor* is to design

- (1) The Contractor provides the whole of the works as defined in this Works Information except where explicitly stated as otherwise.

#### 3.2.1 Design Criteria

- (1) The design needed to conform to the following criteria:
  - iii. Installation of the new HMI must require a minimum of changes to the existing control equipment and SCADA communication network in order to achieve the project objectives.
  - iv. The new HMI must be able to collect data from all PLCs using natively supported protocols (Profibus and Profinet for Siemens equipment, ModbusPlus/TCP for Modicon equipment).
  - v. The new HMI must contain an engineering system capable of interfacing with a maximum number of PLCs over the Profinet communications network.

- vi. The engineering system must either be integrated with the HMI, or be able to provide forward engineering capabilities to the HMI, eg automatic tag generation from PLC source code.

### **3.2.2 Codes and Standards**

- (1) The new HMI system should conform to the Eskom Standard 240-56355728 Human Machine Interface Design Requirements Standard.
- (2) This standard describes the required capabilities of HMI software and the manner in which it must be configured to display information to operators.

### **3.2.3 Key Design Driver**

- (1) Elimination of obsolescence risks due to currently installed SCADA equipment
- (2) Reuse of hardware
  - i. This is required as a cost-savings exercise. The fibre optic cables used for the L2 network are also still in good condition – reuse of these is recommended due to the lack of cable ways in the outside plant, with trenching for new cables being disruptive and expensive.
  - ii. The fibre optic cables used for the ModbusPlus network can be reused.
- (3) Minimise disruption of network
  - i. The current L2 network is serial in nature, meaning incorrect configuration of the bus can result in multiple PLCs becoming unavailable.
  - ii. If the existing fibre cables are to be repurposed from the serial network to an Ethernet network, care must be taken to ensure this does not result in the entire L2 bus becoming unavailable. Similar considerations exist for the Modbus network.
- (4) Standardisation of hardware
  - i. The new HMI hardware purchased to replace obsolete equipment must be standardised with existing hardware on site to the greatest degree possible.
  - ii. Standardisation should reduce training, maintenance and spares holding requirements.
- (5) Standardisation of communications protocols
  - i. The makeup of the communications network should be as homogenous as possible, to reduce the complexity of the system and simplify maintenance and troubleshooting.
- (6) Redundancy and failure mode considerations
  - i. The level of availability required of the control hardware must be matched to that of the plant equipment being controlled.

### **3.2.4 System Architecture**

- (1) The HMI system should consist of four major components: the servers, the engineering clients, the operating clients and printers
- (2) The servers should operate as the central repository for all engineering data relating to the outside plant control system, and/or all configuration data relating to the HMI. The engineering and operating functionality be present in the form of a single application suite. The engineering of the overland conveyors may require a separate software platform to that of the outside plant. In this case, it may not be cost effective to install a separate engineering server – instead a dedicated engineering station may be used to consolidate engineering data, which may be disconnected from the HMI configuration.
- (3) The servers shall be the devices primarily responsible for communication with the control devices – requests for process variables and operating/engineering/maintenance commands shall originate

from the respective server, rather than from operating or engineering clients. This is primarily to ensure consistency of process and engineering data.

- (4) Process data shall be stored locally on the operating server, as well as forwarded from the operating server to the station historian using a tunnelled OPC interface. It shall be possible to maintain a local copy of all relevant process data on the operating server for a minimum of three months.
- (5) The engineering clients will be thin clients, which only act as an interface to the engineering server. .
- (6) The operating clients will be thin clients which only act as an interface to the operating server. It should not be possible for contradictory plant data to be displayed on two different operating stations.
- (7) The HMI must be licenced for 10 000 tags.

### 3.2.5 External Interfaces

- (1) The HMI system is required to interface with the following other systems:
  - i. Existing PROFINET network:
    - a. Currently this network consists of the bunker level, the Marshalling, the Driefontein Dam, AWR, SWB and FAC PLCs, which are all of the Siemens S7 family.
    - b. The HMI can connect to this network at the LP Services building or in the 16ml Boiler substations.
    - c. Any other existing PLCs capable of communicating via PROFINET should be changed from L2-FDL to PROFINET as part of this project, provided a feasible method of extending the PROFINET segment can be identified.
  - ii. Existing L2 FDL bus:
    - a. This bus should be accessed via the marshalling PLC on the PROFINET network as described above.
    - b. The Marshalling PLC will need to be reprogrammed to act as a gateway device, forwarding data from L2 to PROFINET, rather than the current configuration in which it forwards PROFINET data onto the L2 bus.
  - iii. Existing ModbusPlus bus:
    - a. A ModbusPlus to ModbusTCP converter is required, to avoid the reliance on serial interface cards.
  - iv. Plant Historian:
    - a. The new HMI network will exist as a standalone network with a new connection to the PIS network.
    - b. A tunnelled OPC link to the PIS must be established through a set of redundant firewalls.
    - c. The OPC tunnel link will utilise a server-client configuration across the redundant firewalls.
    - d. Configuration of the OPC client and Station Historian to be done utilising the OEM of the Historian.
    - e. Existing fibres will be used for the above connection with the exclusion of the new fibre patch leads which are required to be provided by the *Contractor*.
    - f. The OPC link should be capable of handling ten thousand (10000) tags

### 3.2.6 Maintenance Concept

- (1) As per C&I strategy, all computer equipment should have a life expectancy of six to eight years and be operated in a run-to-failure manner.
- (2) Proactive replacement of server hardware and/or software will be as per OEM recommendations, such as in instances of obsolescence or compatibility considerations.

- (3) It must be possible for all HMI components to be replaced by site personnel in the event of failure.
- (4) Upgrade of server hardware and software will be handled as a project with OEM assistance.
- (5) All server should have the following capabilities:
  - i. Use dedicated server hardware
  - ii. Hot swappable redundant power supplies
  - iii. Hot swappable redundant hard drives via a suitable RAID configuration
  - iv. 19" Rack mounted
  - v. Redundant CPU
  - vi. Redundant case fans
- (6) Printers to be colour laser.

### 3.2.7 Operating Concept

- (1) The operating concept of the control room should remain as is, with the exception of the addition of another four monitors.
- (2) The screens must be mounted on stands in two two-by-two sets to improve space utilisation.
- (3) The ability to remotely operate plant must be aligned with existing local operator interfaces to prevent conflicting operating parameters being received by control equipment.
- (4) Implementation of remote operator controls will be implemented only for non-obsolete control equipment which is connected to the PROFINET network.
- (5) Remote operator actions for plant areas that do not meet this requirement will be implemented at a later stage as control equipment at each plant location is upgraded.
- (6) The functionality provided by the HMI includes but is not limited to the following:
  - i. Operating functionality
  - ii. Indication
  - iii. Alarming
  - iv. Trending, historical and live
  - v. On-line plant performance information
  - vi. Event viewing (including operator action events)
  - vii. Access to historical operating data
- (7) Selection of any HMI graphic does not require more than two keystrokes.
- (8) Individual users have the ability to configure, save and restore the arrangement of the HMI graphic pages on the operating and overview screens
- (9) All information available to the operator from the HMI system is printable. The facility to print user-defined hard copies of specific occurrences forms an integral part of the system.
- (10) The Windows standard interface is deactivated for operators
- (11) In addition to the standard trending functionality, pre-configured trends are provided on the HMI. These trends will be decided upon during detailed design phase.
- (12) HMI Response Times:
  - i. a. The maximum time taken to completely populate a HMI graphic page or faceplate with dynamic data shall not exceed 1.5 seconds.
  - ii. b. The average time taken to completely populate any HMI graphic page or faceplate with dynamic data shall be less than 0.5 seconds.
  - iii. c. The maximum time taken to completely populate a trend with dynamic data shall not exceed 3 seconds.
  - iv. d. The average time taken to completely populate any trend with dynamic data shall be less than 1.5 seconds.

### **3.2.8 Safety Concept**

- (1) The new HMI will be implemented with standard 220V computer equipment.
- (2) No particular safety concerns are noted, other than those normally related to the installation and operation of computer equipment.
- (3) Safety concepts related to the plant areas being displayed on the HMI reside in the control equipment which will not be impacted by this project.

### **3.2.9 Information Technology Strategy**

- (1) No interfacing to IT network will be allowed directly or even through a firewall.

### **3.2.10 Operational Technology Strategy**

- (1) All communication should be by wired, Ethernet based protocols to the greatest extent possible.
- (2) The eventual field network configuration of a redundant ring should be provisioned for.
- (3) All servers should display a sufficient level of redundancy i.e. redundant, hot swappable power supply units, redundant storage devices and redundant physical servers.
- (4) A data backup and disaster recovery system should be provided. This should be automated to the greatest extent possible, eg automated backups of to a storage network or similar.
- (5) All network equipment should be managed industrial-type and passively cooled, with native support for network ring standards such as RSTP, as well as with PROFINET where required.
- (6) RuggedCom, Siemens Scalance, Moxa or Hirschman are the preferred brands to standardise with other equipment on site.
- (7) Operating voltage, mounting requirements and uninterrupted power requirements will be determined as part of the design.
- (8) Existing network switches in the LP Services building and 16m Boiler substations may need to be replaced if they are not compatible with the new equipment.
- (9) The HMI equipment must be on an independent subnet.
- (10) Either an IP address range or specific IPs will be issued by the station accordingly.
- (11) Server equipment must be powered from the Station UPS in a redundant manner – two existing 220V chargers are available to enable full redundancy of power supply.
- (12) Two operator stations are required; each shall be powered by a separate UPS.
- (13) Redundant switches shall also be provided; again each will be powered from separate supplies.
- (14) The status of all servers and computer devices forming part of the HMI/engineering system shall be visible in the HMI software, and any faults detected shall be alarmed in the HMI.
- (15) Diagnostic information relating to connected control equipment shall also be displayed and alarmed where existing control equipment provides such functionality.
- (16) The capabilities of the HMI software shall conform to Eskom Standard 240-56355728.
- (17) All HMI equipment must retain time synchronisation with the server equipment using NTP over the HMI network. All compatible control equipment must be time synched to the server equipment. The



server equipment must be synchronised to an existing GPS time clock – the practicality of connection to the various existing clocks will be investigated as part of the basic design.

(18) Interface to the plant historian must be through redundant interfacing firewalls.

(19) The rule-set will also be configured on the new firewalls.

### 3.2.11 Cyber Security

(1) The *Employer* is required to adhere to standards as set apart by its head office.

(2) The design of the *Contractor* should conform to the requirements as set out in the following standards:

- i. 240-55410927 - Cyber Security Standard for Operational Technology Rev 2
- ii. 240-79669677 - DMZ Designs for OT Rev 1
- iii. 240-56355728 - Human Machine Interface Design Requirements Standard Rev 2

### 3.2.12 Alarm Management System

(1) Re-design the alarm system such that advanced filtering is available to enable nuisance and unnecessary alarms to be disabled via the HMI interface, this must also be done for all the tags.

(2) A comprehensive and integrated alarm handling system is employed. The alarm handling system clearly distinguishes between different alarm types and provide alarm filtering functionality.

(3) Alarm information is not lost or inaccessible whilst navigating through displays. Alarm presentation is dynamically provided to the operator with information matched to the current situation and its criticality.

(4) Nuisance alarms are not repeated on the alarm pages.

(5) Users are able to navigate directly from any alarm to the alarm response sheet for that specific alarm.

(6) The filtered alarms must still be available on the Engineering System

(7) Nuisance alarms are not repeated on the alarm pages.

(8) Users are able to navigate directly from any alarm to the alarm response sheet for that specific alarm.

(9) Alarm response sheets are provided for all configured alarms including alarms specific to the C&I system.

(10) All alarm response sheets comply with the requirements of 240-56355466, Alarm Management System Guideline.

### 3.2.13 Civil

#### 3.2.13.1 HMI Cabinets Pedestals

(1) Due to the false floor safe working load being unknown; Pedestals are required to support the HMI cabinets. These Pedestals are to distribute the cabinet load directly onto the ground slab under the false floor. Thus bypassing the false floor completely.

(2) The pedestal needs to accommodate the cables entering the cabinets.

- (3) The designs are to include details on how the existing false floor will be modified to accommodate the Pedestals. The method of construction must be clearly defined and accepted prior to construction.
- (4) All designs to compile with the latest SANS standards and Eskom Standards (240-56364545 Structural Design and Engineering Standard Revision 2), and all design documents to be submitted to the Eskom Civil & Structural department for review prior to construction.

### **3.2.13.2 Electrical**

- (1) The new HMI Upgrade must be supplied from new rack mount, dual redundant Uninterruptible Power Supplies (UPSs).
- (2) Each UPS should not be loaded at more than 50% when powering all associated equipment.
- (3) The Contractor supplies and installs and commissions the following:
  - i. 2 x circuit breakers for the new HMI cabinets to power the new HMI equipment.
  - ii. 2 x 220V, 3 core (neutral, live and Earth) power cable from the DB to new new HMI equipment.
  - iii. Terminate the 220V power cable on both ends.
  - iv. The DB is located in the same room as the cabinet location and additional details will be provided during detailed design.

### **3.3 Procedure for submission and acceptance of *Contractor's* design**

- (1) The Contractor submits any drawing or documentation that will fulfil the requirements of this works
- (2) All drawings or documentation are submitted to the Project Manager in a formal communication
- (3) Statement of design acceptance or a list of design faults will be issued within two weeks of design receipt by the Project Manager

### **3.4 Other requirements of the *Contractor's* design**

- (1) The equipment requirements are defined in this Works Information and also in the following documents:
  - i. Appendix 1 – List of documents required from the Contractor
  - ii. Appendix 2 – Limits of Supply and Services
  - iii. Appendix 3 – List of Standards
  - iv. Appendix 4 – Testing Requirements and Acceptance criteria

### **3.5 Use of *Contractor's* design**

- (1) The design will become the intellectual property of the Employer.
- (2) No design information may be withheld from the Employer.
- (3) All information pertaining to the design must be handed over to the Employer after completion of the Works.

## **4. Procurement**

### **4.1 People**

#### **4.1.1 Minimum requirements of people employed on the Site**

- (1) The Contractor shall comply with Basic Condition of Employment Act and Labour Relation Act for the use of labour in executing the works to give effect to the right to fair labour practices referred to in section 23 (1) of the Constitution by establishing and making provision for the regulation of basic conditions of employment; and thereby to comply with the obligations of the Republic as a member state of the International Labour Organisation; and to provide for matters connected therewith.
- (2) The contractor must have at least 2 of Supervisory and Artisan staff authorized in Plant Safety Regulations and/or High Voltage Regulations. In order for any person to do work at the Power Station, this person should be authorized to take out a permit to work.
- (3) The courses for this will be presented free of charge to contractors and bookings must be done via the Project Manager.
- (4) N.B Access to the switchgear/equipment rooms the Contractor to comply to the following prior to access being granted:
  - i. The Contractor's Supervisor to attend the Arc Flash Course (PSR Module 5) and pass the required test. The course will be offered by the Employer at no cost and Course dates will be announced after Contract Award.
  - ii. Contractor to ensure that all personnel working in the room wear special overalls due to the nature of equipment in the rooms.
- (5) Overall specification – Arch Flash Proof Overall Class 2, Material: Protera (ATPV 12CA/cm2) Colour: Blue. Suggested Supplier: Quality Safety 1990 Pty Tel 016 365 5770.

#### **4.1.2 BBBEE and preferencing scheme**

- (1) Eskom's policy is to maximise purchases from Black or Black Empowering Enterprises (BEE's) whether Black Woman-owned, small or Large Black or Black empowering suppliers. The purpose is to promote entrepreneurship in black communities and give black business access to the mainstream of business opportunity.
- (2) Eskom will concentrate its development efforts on black suppliers in manufacturing, construction and mining /extraction sector.

## **4.2 Subcontracting**

#### **4.2.1 Preferred subcontractors**

- (1) Subcontracting the OEM of Visual Automation will be required in order to setup the interface from the new HMI system to the existing Plant Information System.

#### **4.2.2 Subcontract documentation, and assessment of subcontract tenders**

- (1) The Contractor shall submit the proposed contract data for each subcontracting for acceptance to the Project Manager.

- (2) The Contractor shall prepare subcontracting document as according to NEC contract.
- (3) The Contractor must inform the Employer's representative when intending to subcontract some of the works from the contract scope.
- (4) The Contractor shall take full responsibility for the subcontractor's quality of work.

#### **4.2.3 Limitations on subcontracting**

- (1) The Contractor shall not subcontract more than 25% of the contract scope

#### **4.2.4 Attendance on subcontractors**

- (1) The Contractor shall in writing inform the Employer's representative about the subContractor intentions for site visit

### **4.3 Plant and Materials**

#### **4.3.1 Quality**

- (1) All work is carried out under the supervision of an experienced supervisor.
- (2) The Contractor complies with the Employer's Quality Requirements as specified in Eskom Generation Standard QM58. The Contractor, when using materials that are required to comply with a standard specification
- (3) Shall, if so ordered, furnish the Engineer with certificates showing that the materials do so comply.
- (4) Where so specified, materials shall bear the official mark of the appropriate standard.
- (5) Samples ordered or specified shall be delivered to the Engineer's office on the Site.
- (6) Unless otherwise specified, all proprietary materials shall be used and placed in strict accordance with the published instructions of the relevant manufacturer.
- (7) All quality control documentation is submitted to the Project Manager within 7 days of Contract date.

#### **4.3.2 Plant & Materials provided "free issue" by the *Employer***

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

#### **4.3.3 Contractor's procurement of Plant and Materials**

- (1) The Contractor shall make use of SABS approved plant and material.
- (2) Test certificates shall be given to the Project Manager of the project.

- (3) The Contractor's material should comply with the Eskom Standards as a minimum.

#### **4.3.4 Spares and consumables**

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

#### **4.4 Tests and inspections before delivery**

- (1) The Contractor does not bring to the working area those plant and material which the works information states are to be tested or inspected before delivery until the supervisor has notified the Contractor that they have passed the test.

#### **4.5 Marking Plant and Materials outside the Working Areas**

- (1) All plant and materials outside working areas are to be marked "for Contractor" until such time that they are tested and installed at the site/plant.

## 5. Construction

### 5.1 Temporary works, Site services & construction constraints

#### 5.1.1 Employer's Site entry and security control, permits, and Site regulations

- (1) The Contractor applies for access permits for all works exceeding four (4) weeks via the Project Manager, who will co-ordinate this.
- (2) The Contractor applies for Contractor's Permits for all his employees and/or subContractors at the Security gate, at least 24 hours prior to entry of the Duvha Power Station Security Area. .
- (3) The Contractor completes the specific form in the Duvha Power Station Contractors Safety Manual, listing all of the personnel that he intends using on site.
- (4) The completed list, identified with the Contractor's name, contains the following information:
  - i. Employee Name
  - ii. Employee ID Number
  - iii. Eskom Safety Co-ordinator signature
  - iv. Eskom Project Manager signature
  - v. Validity Date
- (5) No permits are issued to personnel who have not attended safety induction.
- (6) The Contractor photocopies the first page of the ID book of every one of his employees; reduced to the size 65%.
- (7) This completed list, together with the certified photocopies of the ID books is delivered to Protective Services for the preparation of the Contractor's Permits.
- (8) The Contractor allows at least 24 hours for the preparation of the security permits, before he collects the permits from the Protective Services offices.
- (9) The Contractor's personnel are required to be in possession of a Contractor's Permit at all times inside Duvha Power Station.
- (10) All Contractors' permits are submitted back to Protective Services when the workers leave the site after completion of the works. Failure return the permits will result in a R50,00 penalty for each non returned permit.
- (11) The Contractor compiles detailed Tool Lists (obtainable from Protective Services) of all tools and equipment to be taken on site before arriving at the power station.
- (12) Authorised copies of these lists are retained to be used again when the tools and equipment is removed from site.
- (13) The Contractor's visitors and all personnel conform to the security arrangements in force at Duvha Power Station.
- (14) Application forms for visitors are filled in by the Contractor's Site Manager and approved by the Project Manager, and submitted to the Employer's Protective Services office one day prior to the visit.
- (15) Visitors will not be allowed on site if the necessary forms are not in the possession of security staff.
- (16) The Chief Security Officer may, with valid cause, remove any of the Contractor's personnel from the site, either temporarily or permanently. He may deny access to the site to any person whom, in the opinion of the said Chief Security Officer, constitutes a security risk.

- (17) No unauthorised vehicles will be allowed on site. Only Contractor's vehicles with displayed Contract Vehicle Permits disks will be allowed on site. Contract Vehicle Applications are directed to the Project Manager for consideration and approval.
- (18) The Contractor is restricted to the Site. The Contractor is forbidden to enter any other areas, and ensures that his employees abide by these regulations.
- (19) Parking inside the power station is strictly forbidden, except for loading purposes.
- (20) No recruiting of casual labour may be done on Eskom premises, including the area outside the Power Station Security Gate.
- (21) Security personnel may search any premises, property or person within the security area of Duvha Power Station
- (22) No Photographic equipment will be allowed within the security area of the Power Station without obtaining permission.
- (23) Application forms for such permission is available from the Protective Services offices.
- (24) Any person found in possession of such equipment will be prosecuted in terms of the National Key Point Act
- (25) The Contractor shall comply with SHE Specification 74 and Eskom Standard 36-681: Plant Safety Regulations.

#### **5.1.2 Restrictions to access on Site, roads, walkways and barricades**

- (1) Pedestrian crossing are made on the road they should be used when crossing the road
- (2) Inside the plant walkways are clear makes they should be used when walking inside the plant to keep safe on any object that might fall.
- (3) Barricades are provided where there are open trenches and around the sumps and manholes.
- (4) The Contractor shall occupy only such ground as is necessary to carry out the works.
- (5) All fences and other structure that have been damaged or interfered with by the Contractor shall be restored to be a condition at least equivalent to their original condition

#### **5.1.3 People restrictions on Site; hours of work, conduct and records**

- (1) The LAR is for the person in charge of the plant to maintain control over activities taking place on his plant that are not covered by the Plant Safety Regulation and Operating Regulations for High Voltage Systems.
- (2) Activities that are allowed to be carried out under the LAR must not require a permit and must satisfy the following criteria:
- (3) They must not involve danger to the person carrying out the activity;
- (4) No plant isolations must be required;
- (5) The activity must be performed by a skilled person and there must be no risk of a production loss;
- (6) The duration of the activity must be less than 24 hours
- (7) The Supervisor accompanies the Contractor during the first instances of working under a LAR on a specific plant area.

- (8) It is very important that the person who plans to do an activity on a plant under the LAR for that relevant area, informs the person in charge of the plant of what will be done.
- (9) This means verbally telling the person in charge of the plant what will be done and not just signing the LAR book. The LAR book is also signed.
- (10) It is also important that as soon as the activity is completed the person, who was doing the activity, notify (verbally) the person in charge of the plant that conditions are back to normal and that the LAR has been signed off. Just signing the LAR book is not sufficient.
- (11) For more information please refer to Plant Safety Regulation C11.

#### **5.1.4 Health and safety facilities on Site**

- (1) The Contractor provides a First Aid service to his employees and sub-Contractor. In the case where these prove to be inadequate, like in the event of a serious injury, the Employer's Medical Centre and facilities will be available.
- (2) Outside the Employer's office hours, the Employer's First Aid Services will only be available for serious injuries and life threatening situations. The Employer shall be entitled, however, to recover the costs incurred, in the use of the above Employer's facilities, from the Contractor.
- (3) The Contractor to ensure that qualified and competent First Aiders and Emergency Care staff is permanently on site and at actual construction site for emergency situations, as and when they arrive.
- (4) The Contractor or his staff shall not move the injured party from the incident position and site unless the person's/persons' life is in danger or the person is moved by a qualified and trained Emergency Care Worker.

#### **5.1.5 Environmental controls, fauna & flora, dealing with objects of historical interest**

- (1) No fauna or flora will be collected or removed from any farm by any visitor without written permission of the landowner, in which case cognizance will be taken of appropriate provincial legislation pertaining to fauna and flora.
- (2) Under such cases Eskom Holding's ethical policies and guidelines will be strictly applied.

#### **5.1.6 Title to materials from demolition and excavation**

- (1) The Contractor has no title to an object of value or historical or other interest within the site
- (2) The Contractor shall notify the Project Manager when such an object is found and the Project Manager will instruct the Contractor how to deal with it.
- (3) The Contractor does not move the object without instruction.

#### **5.1.7 Publicity and progress photographs**

- (1) Should publicity and progress photographs be required an application shall be made via the Project Manager.



#### **5.1.8 Contractor's Equipment**

- (1) Any equipment brought to site by the Contractor must be declared on entry to security personnel
- (2) Said equipment will be issued a permit, which will be required to remove the equipment from site

#### **5.1.9 Equipment provided by the Employer**

- (1) Should the Contractor require using of any of the Employer's Equipment, including compressed air, electricity, water supply and crane age, it must be specified in the Works Information supplied by the Contractor.
- (2) The Employer does not guarantee continuity of supply of any of items in point (1).
- (3) The Employer shall be entitled to withdraw use of the said Equipment, should proper maintenance and cleanliness not be ensured.
- (4) In the event of point (3), the Contractor shall be obliged to provide the necessary Equipment at his own cost.
- (5) The Contractor is responsible for the repair, replacement or correction as necessary of all pieces of tools and equipment supplied by the Employer which are damaged and / or lost whilst in the Contractor's custody and control.
- (6) The Contractor's site manager must ensure that any one of his employees or Sub-Contractor, operating hoist equipment belonging to the Employer, is authorised by an Accredited Company and retraining is done annually.
- (7) Arrangements for training courses can be made via Duvha Power Station Maintenance Training but the Contractor will absorb costs.
- (8) A copy of this accredited and valid training certificate must be given to the Employer's Supervisor, who will then arrange access for usage.

#### **5.1.10 Site services and facilities**

- (1) The Employer will provide the Contractor access to toilet facilities free of charge.
- (2) The Contractor or any of his employees or Sub Contractors will not be allowed to use the Employer's dining facilities, unless a specific agreement has been made between the Contractor and Eskom Catering and Accommodation Services (ECAS).
- (3) The Contractor or any of his employees or Sub Contractors may buy take away meals from the fast foods outlet on site.
- (4) The Contractor provides a First Aid service to his employees and Sub Contractors. In the case where these prove to be inadequate, like in the event of a serious injury, the Employer's Medical Centre and facilities will be available.
- (5) Outside the Employer's office hours, the Employer's First Aid Services will only be available for serious injuries and life threatening situations.
- (6) The Employer shall be entitled, however, to recover the costs incurred, in the use of the above Employer's facilities, from the Contractor

- (7) For the full duration of the works, the Contractor is responsible to keep the work area clean of any rubble, and to dispose all refuse to a registered dumpsite. There is no such dumpsite available at Duvha Power Station.
- (8) All waste introduced and/or produced on Eskom's premises by the Contractor for this Contract, must be handled in accordance with the minimum requirements for the Handling and Disposal of Hazardous Waste in terms of Government Legislation as proclaimed by the Department of Water Affairs and Forestry Act 1994 Ref.: ISBN0621 - 16296-5.

#### **5.1.11 Facilities provided by the Contractor**

- (1) The provision of accommodation for Contractor's personnel shall be the responsibility of the Contractor

#### **5.1.12 Underground services, other existing services, cable and pipe trenches and covers**

- (1) A survey must be carried out to determine if any underground cabling and services will hinder the design and execution of the project.
- (2) If no up-to-date drawings are available for such purposes as in point (1), the onus falls on the Contractor to perform an on-site survey.
- (3) Any cables identified during the survey must be marked on the drawing.
- (4) If during execution of the project any damage to identified or unidentified underground cabling and services occur, the cost of repair will be for the Contractor.

#### **5.1.13 Control of noise, dust, water and waste**

- (1) The Contractor ensures that all necessary notices and barricading are set up to ensure safety of people working in the area of the works.
- (2) All necessary precautions should be made to minimise impact of dust or noise.

### **5.2 Completion, testing, commissioning and correction of Defects**

#### **5.2.1 Work to be done by the Completion Date**

- (1) On or before the Completion Date the Contractor shall have done everything required to Provide the Works except for the work listed below which may be done after the Completion Date but in any case before the dates stated.
- (2) The Project Manager cannot certify Completion until all the work except that listed below has been done and is also free of Defects which would have, in his opinion, prevented the Employer from using the works and Others from doing their work.

	<b>Item of work</b>	<b>To be completed by</b>
	As built drawings of 2.13.6	Within 5 days after Completion

	Performance testing of the <i>works</i> in use as specified in paragraph 5.2.5 of this Works Information.	See performance testing requirements.

### 5.2.2 Commissioning

- (1) Refer to Section 2.13.5

### 5.2.3 Take over procedures

- (1) During take over, the *Contractor* is responsible to demonstrate to the relevant parties the completed works.
- (2) If any concerns are raised during the demonstration, the onus falls on the *Contractor* to address and correct.
- (3) If any concern as per point (2) was part of the works, the final signoff will be postponed until such concerns have been addressed.

### 5.2.4 Access given by the *Employer* for correction of Defects

- (1) If the *Contractor* is required to correct any defect, a Permit To Work (PTW) will be issued based on the defect which is to be corrected.
- (2) The availability of the PTW will be dependent on the plant accessibility and constraints.

### 5.2.5 Performance tests after Completion

- (1) The performance of the system will be verified and tested during normal production cycles.
- (2) If any defect or deviation from the required performance is identified, it will be treated as a defect and applicable clauses will apply.

## **6. Plant and Materials standards and workmanship**

### **6.1 Investigation, survey and Site clearance**

- (1) Investigation of the site must be conducted in order to gather any information required to complete the requirements of Section 3.
- (2) A site survey, which includes equipment and control rooms must be carried out in order to ensure the ergonomics aspect of the design is not limited by physical plant equipment or material.

### **6.2 Electrical & mechanical engineering works**

#### **6.2.1 General**

- (1) Refer to Appendix 3 for 240-56227443 Requirements for Control and Power Cables for Power Stations Standard for Electrical cabling requirements.

### **6.3 Process control and IT works**

#### **6.3.1 General**

- (1) All equipment is available in South Africa as commercially- off- the-shelf (COTS) products.
- (2) All equipment is to conform to TIA-1005

#### **6.3.2 Control & Instrumentation Requirements**

##### **6.3.2.1 Network/Equipment Cabinet**

- (1) Rack height of 42U
- (2) Ventilated front and back doors
- (3) Width x Depth - 800mm x 1000mm

##### **6.3.2.2 Fibre Patch Panels**

- (1) Fibre Patch Panels are fitted with ST connectors as per IEC61754-2

##### **6.3.2.3 Copper Patch Panels**

- (1) Copper patch panels are fitted with 8P8C (RJ45) Keystones as defined in TIA-568.
- (2) 8P8C Keystones are wired according to the T568A standard.

##### **6.3.2.4 Fibre Optic Ethernet Cabling**

- (1) All fibre optic cabling is 50/125um Multimode cabling operating at 850nm.
- (2) No segment of fibre cabling exceeds 450m in length.
- (3) All fibre optic cables excluding fibre pig tails are terminated in patch panels and not in splice boxes.
- (4) Fibre optic cabling segments form a ring.
- (5) Redundant portions of the ring are physically separated unless agreed upon and approved by Employer
- (6) Fibre optic cabling installation conforms to TIA568-C.3

##### **6.3.2.5 Copper Ethernet Cabling**

- (1) All copper Ethernet cabling is Category 5e or Category 6.
- (2) No segment of copper cabling exceeds 50m in length.
- (3) All copper cables entering a network cabinet are terminated onto a patch panel.

- (4) The field end of a copper cable may be fitted with an 8P8C jack as defined in TIA568.
- (5) All 8P8C jacks are wired according to the T568A standard unless a crossover cable is required.
- (6) Copper cable installation conforms to TIA568-C.2

### 6.3.2.6 Trunking

- (1) The *Contractor* may make use of network trunking running along the 16m boiler wall and the 33m turbine wall. This trunking may only be used for fibre optic cables.
- (2) The *Contractor* may make use of network trunking running from Unit 1&2 new equipment room to the Main Admin Building server room. This trunking may only be used for fibre optic cables.
- (3) The *Contractor* may make use of network trunking running from Unit 3&4 new equipment room to the Main Admin Building server room. This trunking may only be used for fibre optic cables.
- (4) Boxed trunking is provided for all network cabling
- (5) The boxed trunking used for network cabling is dedicated to the network cabling and is not used for any other cabling
- (6) Any new trunking should be installed such as to prevent dust, ash or water collecting within the trunking.
- (7) Trunking is specified such that it fulfils the requirements of TIA568-C.2, TIA568-C.3 and TIA1005

### 6.3.2.7 Cabling and Wiring

#### 6.3.2.7.1 General

- (1) The design, supply, installation, termination, labelling, testing and commissioning of all wiring and cabling is provided
- (2) All cables as a minimum are insulated with flame-retardant, halogen-free PVC outer sheath
- (3) Internal cores of all multi-core cables must be colour coded
- (4) The routes for power supply cabling, network cabling and the trunking is of a consistent and integrated design, that takes into account different cabling and racking routes for common modes of failure and the redundancy concepts of the automation system design
- (5) The cable routes are designed such that equipment can be removed for maintenance without causing damage to the cables.
- (6) All cables and wires provided are secured with suitable cable glands, straps or clamps
- (7) All cables terminating in cubicles are such that, maintenance is achieved easily on faulty cables; thus the number of cables per access way is restricted to facilitate this.
- (8) Durable cable numbering /labelling is provided for all cables entering the cubicles, the numbering /labelling is such that maintenance on cables is easily achieved
- (9) Conduit and trunking to conform to standards listed in Appendix 3.
- (10) All wire terminations to use appropriate lugs
- (11) Any termination to conform to standards listed in Appendix 3.
- (12) Cabling shall comply to Eskom standard 240-56227443 Requirements for Control and Power cables for Eskom Power stations

#### 6.3.2.7.2 Cable Schedules

- (1) Accurate records are kept in Cable Schedules by the *Contractor* for all cabling forming part of the Works.
- (2) The cable schedules are provided inclusive of origin, target, type, size and termination details.
- (3) Termination schedules are provided for all cables

#### 6.3.2.7.3 Cable Management

- (1) A cable stock schedule is kept by the *Contractor* to record all cables delivered to and removed from Duvha site.

- (2) The installed cabling is reconciled with the cable stock schedule.

## 7. List of drawings

### 7.1 Drawings issued by the *Employer*

This is the list of drawings issued by the *Employer* at or before the Contract Date and which apply to this contract.

Note: Some drawings may contain both Works Information and Site Information.

Drawing number	Revision	Title

#### 7.1.1. Appendix 1: List of documents required from the contractor



Appendix 1 List of documents required

#### 7.1.2. Appendix 2: Limits of Supply and Services



Appendix 2 Limits of Supply and Services

#### 7.1.3. Appendix 3: List of Standards



Appendix 3 List of Standards.xlsx

#### 7.1.4. Appendix 4: Testing Requirements and Minimum Acceptance Criteria



Appendix 4 Testing Requirements and Minimum Acceptance Criteria

**Duvha Water Treatment Plant Human Machine Interface (WTP HMI) – Heating, Ventilation and Air Conditioning Upgrade (HVAC)**

## **C3.2 *CONTRACTOR'S* WORKS INFORMATION**

This section of the Works Information will always be contract specific depending on the nature of the *works*. It is most likely to be required for design and construct contracts where the tendering contractor will have proposed specifications and schedules for items of Plant and Materials and workmanship, which once accepted by the *Employer* prior to award of contract now become obligations of the *Contractor* per core clause 20.1.

Typical sub headings could be

- a) *Contractor's* design
- b) Plant and Materials specifications and schedules
- c) Other

This section could also be compiled as a separate file.

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### **7.1 Appendix A Environmental Management Policy**

### **7.2 Appendix B ENV0005- Procedure for waste management**



Microsoft Word  
Document

### **7.3 Appendix C Supplier Contract Quality Requirement**



QM-58 Supplier  
Contract Quality Req

### **7.4 Appendix D Access Control Visitors Appointment**



Access Control  
Visitors Appointment

### **7.5 Appendix E AKZ Plant labelling standard**



Microsoft Word  
97-2003 Document

### **7.6 Appendix F SHE Requirements**



32-726 (0) SHE  
Requirements for the

**Duvha Water Treatment Plant Human Machine Interface (WTP HMI) – Heating, Ventilation and Air Conditioning Upgrade (HVAC)****PART 4: SITE INFORMATION**

Document reference	Title	No of pages
C4	This cover page	1
	Site Information	
	Total number of pages	



**Duvha Water Treatment Plant Human Machine Interface (WTP HMI) – Heating, Ventilation and Air Conditioning Upgrade (HVAC)****PART 4: SITE INFORMATION****C4.1: Information about the *site* at time of tender which may affect the work in this contract****Safety Risk Management**

- 1) The Contractor complies with the requirements of the Duvha Power Station Safety, Health & Environmental Specifications SAS 0012 rev 8.
- 2) **The documents are completed by the Contractor and submitted to the Employer before taking possession of the works.**
- 3) These documents are valid for the duration of the works.
- 4) The Contractor and all his personnel attend a Health and Safety Induction Course prior to starting with the works.
- 5) The induction course is presented by the Safety Risk Department at Duvha Power Station.
- 6) The Contractor makes arrangements with Project manager who will arrange with Safety Risk Management, for a slot and the date scheduled for the course.
- 7) The Contractor submits all the documents as indicated in the Safety, Health & Environmental Specifications relevant to the work to Safety Risk Management before the induction course.
- 8) The Contractor completes all appointments required and ensures that the appointee and appointees fully understand their responsibilities and are competent and trained to execute their duties.
- 9) The appointees/appointee ensures that all duties are carried out and records are kept by the Contractor for review/audit by the Employer or Inspector of Machinery.
- 10) Duvha Safety Risk Management has the right and authority to visit and inspect the Contractor's work place or Site establishment.
- 11) The Contractor supplies and ensures that his employees wear the necessary PPE according the risk assessments performed on the specific tasks to be carried out.
- 12) The Contractor ensures that everyone entering Duvha Power Station under his supervision are medically, physically and psychologically fit to enter Duvha Power Station.
- 13) The medical examination, at the Contractors cost, is carried out by a Registered Professional Occupational Health Practitioner and the examination shall include the following tests:
  - a. Eye Test, Blood Pressure,
  - b. Heart Function,
  - c. Hearing Test and
  - d. Lung Function.
- 14) A thorough examination is done and previous physical injuries, as well as occupational diseases/complications are covered.
- 15) If at any point in time during the execution of the works, the Contractor has a radiation-related

**Duvha Water Treatment Plant Human Machine Interface (WTP HMI) – Heating, Ventilation and Air Conditioning Upgrade (HVAC)**

incident/exposure, the onus is on the Contractor to immediately notify the Employer, the Medical Station, the Risk Manager and the Safety Risk Management Department.

- 16) The onus thereafter is for the Contractor to immediately arrange, at his/her cost, for blood samples to be taken by a Registered Laboratory and for this sample to be sent to the Excellerator Laboratory in Cape Town for full radiation exposure tests. This test results are then to be discussed with the Duvha Occupational Health Practitioners, who will then advise the Power Station Management on the risk, if any, of the incident/exposure.
- 17) The Contractor takes full responsibility and accountability for all other people/staff/personnel/labour that he/she employs or utilises, whether in full-time/part-time/contract basis, in executing the works or other work whilst on the Employers premises.
- 18) The Contractor ensures that Safety Harnesses are used for all work carried out in elevated positions, as defined in the Occupational Health and Safety Act, No 85 of 1993 or any other Code of Practice or standard or the Construction Regulations.
- 19) All safety equipment or Machinery used complies with the SANS Codes of Quality and Practice or any Code as stipulated in the Occupational Health and Safety Act, No 85 of 1993, and any amendments thereto.
- 20) The Contractor at all times consider himself as “Employer” as defined in the Occupational Health and Safety Act, No 85 of 1993 and do not consider himself as under supervision or management of the Employer with regard to Health and Safety Requirements but only from a Commercial Contractual Condition of Contract. Under no circumstances does the Contractor consider himself a sub-ordinate or being given supervision.
- 21) The Contractor provides and maintains his own facilities as required in the Occupational Health and Safety Act, No 85 of 1993 or any other Code of Practice or standard or the Construction Regulations, if not agreed contractually or arranged by the Employer.
- 22) The Contractor has Safety Systems in place at his premises for the total contract period and these shall include the following:
  - a. Safety Management Structure and Compliance to these.
  - b. Statutory Appointments.
  - c. Records and documentation of all Risk and Hazard Analyses.
  - d. Planned Job Observations Records and Documents.
  - e. Employment history and records of all personnel, part-time or full-time or contract labour.
  - f. Medical History of all personnel, part-time or full-time or contract labour
  - g. Training and Competency Records with regard to Safety, Health and Environment.
  - h. Training and Competency Records with regard to the skills he uses to carry out the works or any other works in the Employers premises.
  - i. Compensation Commissioner records and proof of registration.
  - j. Records and documentation with regard to any sub-contractor or labour-only contracts he places or uses to carry out the works or any other works in Employers premises.
  - k. Personal Protective Equipment and Safety Equipment Inspection, training and competency records and documentation.

**Duvha Water Treatment Plant Human Machine Interface (WTP HMI) – Heating, Ventilation and Air Conditioning Upgrade (HVAC)**

- l. Employment contracts for all sub-contractor or labour-only contracts.
- m. Compliance to a Safety System, such as NOSA or any other system that is similar in nature.
- n. Records of all incidents or accidents, and vehicle accidents, incurred during execution of this works or any other works in the Employers premises.
- o. Records of all man-hours, including sub-contractors or labour-only contracts, the Contractor spends on the Employers premises.
- p. Written Safe Work Procedures for all hazardous tasks the Contractor executes on the Employers premises.
- q. A Fall Protection Plan for all elevated work the Contractor does on the Employers premises.
- r. Environmental Plan and awareness training.
- s. Induction training records of his staff by himself/herself.
- t. Minimum wage compliance for the different skills and to which Bargaining Council compliance is made to and proof of membership, if any.
- u. Risk Assessment of this type of works
- v. Proof of authorisation/accreditation from Department of Labour and or other Statutory Body for this type of works, if applicable
- w. Emergency Evacuation and Rescue Plan for the hazardous tasks related to the works.

**Specific Risks**

23) The following risks are identified by the Employer and Contractor specifically addresses these risks to ensure that the works is carried out safely:

- a. Working at heights
- b. High temperatures
- c. Low temperatures
- d. High pressures
- e. High voltage
- f. Windy conditions
- g. Dusty conditions
- h. High noise area
- i. Work is being carried out overhead
- j. Work is being carried out below
- k. Possibility of drowning exists
- l. Work in confined spaces
- m. Possibility of noxious gasses
- n. Possibility of steam release
- o. Possibility of fires or explosions
- p. Chemicals
- q. Biological Hazards

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- 24) Gaskets used are fit for the type of liquid, solid or gas being transported and do not contain any asbestos fibres.
- 25) The ash dust is harmful if inhaled and the Contractor provides proper dust masks to all his personnel working in dusty environments.

**Plant Safety Regulations**

- 26) The Employer, on request from the Contractor, isolates required plant from all sources of danger as described in the Plant Safety Regulations.
- 27) The Project Manager, on request, makes available a copy of the latest revision of the Plant Safety Regulations available to the Contractor.
- 29) The Contractor conforms to all rules and regulations applicable to plant safety and completes the Workman's Register prior to working on the plant.
- 30) The Contractor declares any grinding and welding to be carried out on the workers register.
- 31) At every permit change the Contractor withdraws himself/herself/his staff for that period of permit suspension/revocation and thereafter only proceeds with the works after signing onto the new permit.
- 32) The Contractor ensures that he/she/all sub-contractors/personnel/staff/his visitors are medically, physically and psychologically fit to enter the Duvha Power Station, and specifically any confined space.
- 33) The Contractor is prohibited from entering Radiation Areas.
- 34) The onus is on the Contractor to ensure that the correct confined space requirements and tests have been done/met by the Employer prior to entry into any confined space or hazardous plant areas.
- 35) The Contractor ensures that all personnel are competent to carry out the works.
- 36) Proof of competency for technical and safety aspects must be available as and when required on site.

**Limited Access Register (LAR)**

- 37) The LAR is for the person in charge of the plant to maintain control over activities taking place on his plant that are not covered by the Plant Safety Regulation and Operating Regulations for High Voltage Systems.
- 38) Activities that are allowed to be carried out under the LAR must not require a permit and must satisfy the following criteria:
- 39) They must not involve danger to the person carrying out the activity;
- 40) No plant isolations must be required;
- 41) The activity must be performed by a skilled person and there must be no risk of a production loss;
- 42) The duration of the activity must be less than 24 hours
- 43) The Supervisor accompanies the Contractor during the first instances of working under a LAR on a specific plant area.
- 44) It is very important that the person who plans to do an activity on a plant under the LAR informs the person in charge of the plant (ASS on the panel or PPO at WTP) of what will be done.

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- 45) This means verbally telling the person in charge of the plant what will be done and not just signing the LAR book. The LAR book is also signed.
- 46) It is also important that as soon as the activity is completed the person, who was doing the activity, notify (verbally) the person in charge of the plant that conditions are back to normal and that the LAR has been signed off. Just signing the LAR book is not sufficient.
- 47) For more information please refer to Plant Safety Regulation C11.

**Fire precautions**

- 48) Any tampering with the Employer's fire equipment is strictly forbidden.
- 49) All exit doors, fire escape routes, walkways, stairways, stair landings and access to electrical distribution boards must be kept free of obstruction, and not be used for work or storage at any time. Fire fighting equipment remains accessible at all times.
- 50) In case of a fire, report the location and extent of the fire to the Electrical Operating Desk at extension 2222.
- 51) Take the necessary action to safe guard the area to prevent injury and spreading of the fire.
- 52) Reporting of accidents
- 53) The Employer follows an accident prevention policy that includes the investigation of all accidents involving personnel and property. This is done with the intention of introducing control measures to prevent a recurrence of the same incidents.
- 54) The Contractor is expected to fully co-operate to achieve this objective.
- 55) The Project Manager is informed immediately of any Category B or C incidents. Category A incidents and any damage to property or equipment must be reported to the Supervisor within 24 hours.
- 56) Radiation incidents must be reported immediately.
- 57) In reporting Category C and D incidents, the Contractor submits the following documents, or any additional as required by the Employers investigation team.
- a. Proof of Contract of Employment.
  - b. Proof of WCL notification to Department of Labour.
  - c. Proof of Medical Doctors Note/Certificate detailing nature of injury and period of rest.
  - d. Death Certificate, if Category C fatality.
  - e. Risk and Hazard Analysis, if not in place prior to injury.
  - f. Written Safe Working Procedure, if not in place prior to injury.

**NOTE!** This report does not relieve the Contractor of his legal obligation to report certain incidents to the Department of Labour, or to keep records in terms of the Occupational Health and Safety Act, and Compensation for Occupational Injuries and Diseases Act.

**Occupational Health and Safety Act 1993 - SECTION 37**

- 58) The Contractor and Employer agrees to the arrangements and procedures between them to ensure compliance by the main Contractor (as the mandatory) with the provisions of Section 37.2 of the

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Occupational Health and Safety Act, No 85 of 1993.

59) The Contractor complies with:

- a. the Occupational Health and Safety Act, 1993, and all Regulations made hereunder;
- b. all Eskom Safety and Operating Procedures.

60) The Contractor acknowledges that he is fully aware of the requirements of all the above and undertakes to employ only people who have been duly authorised in terms thereof and who received sufficient safety training to ensure that they can comply therewith.

61) The Contractor undertakes not to do, or not to allow anything to be done which will contravene any of the provisions of the Act, Regulations or Safety and Operating Procedures.

62) The Contractor appoints a person who liaises with the Eskom Safety Officer responsible for the premises relevant to the Contract.

63) The person so appointed on request:

- a. supplies the Eskom Safety Officer with copies of minutes of all Health and Safety Committee meetings, whenever he is required to do so;
- b. supplies the Eskom Safety Officer with copies of all appointments in respect of employees employed on this Contract, in terms of the Act and Regulations and notifies the Eskom Safety Officer of any changes thereto.

64) Eskom may, at any stage during the currency of this agreement, be entitled to:

- a. Do safety audits at the Contractor's premises, its work-places and its employees;
- b. Refuse any employee, Subcontractor or agent of the Contractor access to its premises if such person has been found to commit any unsafe act or any unsafe working practice or is found to be not authorised or qualified in terms of the Act;
- c. issue the Contractor with a work stop order or a compliance order should Eskom become aware of any unsafe working procedures or conditions or any non-compliance with the Act, Regulations and Procedures referred to in the Occupational Health and Safety Act - 1993 and all Regulations made there under as well as all Eskom Safety and Operating Procedures.

65) No extension of time will be allowed, as a result of any action taken by Eskom in terms of the foregoing Clause and the Contractor has no claim against Eskom as a result thereof.

**Hazardous Substances**

66) It is required in terms of the General Administrative Regulation (Regulation 7) that any Manufacture, Importer, Seller or Supplier of hazardous chemical substance supplies the receiver, free of charge, with sufficient information for the user.

**Radiation protection**

67) The Contractor conforms to Duvha procedure HMS0002 when performing any industrial radiography. Thermal insulation containing asbestos.

68) The Contractor does not disturb any thermal insulating material on the plant until it has been

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positively identified as not containing asbestos. Approval is obtained from the Supervisor before any thermal insulation is disturbed.

- 69) All stripping of asbestos material is undertaken strictly in accordance with the Employer's Standard, SAP 0022, available from Safety Risk Management.
- 70) The Project Manager advises the Contractor whether areas that are to be stripped of lagging have been identified as containing asbestos.
- 71) The Contractor is obliged to ascertain from the Project Manager in advance whether areas required to be stripped, are non-asbestos. Any contractor, other than the contractor appointed to remove asbestos strips no lagging material containing asbestos fibres.
- 72) The Contractor appointed to remove asbestos, does not begin removal without first obtaining the necessary permission from the Deputy Director of Labour and the Project Manager.

**Barricading and screens**

- 73) The Contractor provides and installs barricades and warning devices to ensure that equipment and persons are not exposed to danger or to prevent access to dangerous areas.
- 74) Additional to barricading, the Contractor installs screening, such as black plastic, on the roadside to keep dust away from the road. This is in the interest of transport safety.
- 75) All welding, flame cutting and grinding work is prohibited inside and directly outside the fabric filter plant area. All such work is done on ground level.
- 76) All gratings are covered with adequate protective screening when welding or flame cutting in the vicinity.

**Housekeeping**

- 77) The Contractors equipment does not impair the operation of the plant or access to the plant.

**Vehicle Safety**

- 78) No driver may disregard road signs, drive recklessly, exceed the speed limit, exceed the alcohol limit, or do anything contrary to the National Road Traffic Act while on Eskom business.
- 79) No driver may drive a vehicle while holding a cellular or mobile telephone or radio in one or both hands or with any other part of the body. A cellular or mobile telephone or radio equipment may only be used while driving if such telephone or radio device is fitted with a hands-free device, otherwise it must be switched off.
- 80) All drivers including contractor and contractor employees, when performing work for Eskom, must ensure that they and their passengers remain seated and wear seatbelts at all times.
- 81) No employee may be transported in the back of an open vehicle.
- 82) No driver should park a car in such a way that it will be a hazard to other road users.
- 83) No driver may use a vehicle without being authorised.
- 84) No employee is allowed to drive any Eskom-owned or scheme vehicle if not in possession of a valid national driver's licence as well as an Eskom driver permit.

**1. Quality assurance requirements**

- 1) All work will be carried out under the CONSTANT Supervision of an Experienced Competent Supervisor.