

NEC3 Engineering & Construction Contract

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

and

for Design, procure, supply and installation of Affluent Neutralisation Sump Temporary bypass for Lethabo Power Station

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CONTRACT No.

C1: Agreements & Contract Data

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C1.1 Form of Offer & Acceptance

Offer

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract for the procurement of:
Effluent Neutralisation Sump Temporary bypass of Lethabo Power Station

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	
	Sub total	
	Value Added Tax @ 15% is	
	The offered total of the amount due inclusive of VAT is[1]	
	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) .....

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

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.

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		

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*

Clause	Statement	Data
1	**General**	
	The *conditions of contract* are the core clauses and the clauses for main Option	
		A: Priced contract with activity schedule
	dispute resolution Option	**W1: Dispute resolution procedure**
	and secondary Options	
		X1: Price adjustment for inflation
		X2: Changes in the law
		X7: Delay damages
		X15: Limitation of *Contractor's* liability for design to reasonable skill and care
		X16: Retention
		X18: Limitation of liability
		Z: *Additional conditions of contract*
	of the NEC3 Engineering and Construction Contract, April 2013 (ECC3)	
10.1	The *Employer* is (Name):	**Eskom Holdings SOC Ltd (reg no: 2002/015527/30), a state owned company incorporated in terms of the company laws of the Republic of South Africa**
	Address	**Registered office at Megawatt Park, Maxwell Drive, Sandton, Johannesburg**
10.1	The *Project Manager* is:	
	Address	**Lethabo Power Station Deneysville Rd Viljoensdrift**
	Tel	
	Fax	**N/A**

	e-mail	
10.1	The *Supervisor* is:	
	Address	**Lethabo Power Station Deneysville Rd Viljoensdrift**
	Tel No.	
	e-mail	
11.2(13)	The *works* are	**Design, procure, supply and installation of affluent neutralisation sump temporary bypass for lethabo power station**
11.2(14)	The following matters will be included in the Risk Register	**See risk management in part 3**
11.2(15)	The *boundaries of the site* are	**Areas associated with the scope of work to be performed**
11.2(16)	The Site Information is in	**Part 4: Site Information**
11.2(19)	The Works Information is in	**Part 3: Scope of Work and all documents and drawings to which it makes reference.**
12.2	The *law of the contract* is the law of	**the Republic of South Africa**
13.1	The *language of this contract* is	**English**
13.3	The *period for reply* is	**5 Days**

2 The *Contractor's* main responsibilities

Data required by this section of the core clauses is provided by the *ContFractor* in Part 2 and terms in italics used in this section are identified elsewhere in this Contract Data.

3 Time

11.2(3)	The *completion date* for the whole of the *works* is	**30 December 2027**		
11.2(9)	The *key date*s and the *condition*s to be met are:	***Condition* to be met**		***key date***
		1	**Submission of Design**	**To be agreed upon**
		2	**FAT**	**To be agreed upon**
		3	**Delivery**	**To be agreed upon** **Sectional as**

		4 **5**	**Installation**	**per outage schedule**
30.1	The *access dates* are:	**Part of the Site - TBC**		**Date - TBC**
31.1	The *Contractor* is to submit a first programme for acceptance within	**2 weeks of the Contract Date.**		
31.2	The *starting date* is	**TBC**		
32.2	The *Contractor* submits revised programmes at intervals no longer than	**1 week.**		
35.1	The *Employer* is not willing to take over the *works* before the Completion Date.	**The takeover will be sectional**		
4	**Testing and Defects**			
42.2	The *defects date* is	**52 weeks after Completion of each section of the *works*.**		
43.2	The *defect correction period* is	**2 weeks**		
5	**Payment**			
50.1	The *assessment interval* is	• **First one will be after design acceptance by the *Employer.*** • **Second one will be after receiving equipment** • **Third one after approval of SHE file and site establishment** • **Final ones after installation and commissioning**		
51.1	The *currency of this contract* is the	**South African Rand.**		
51.2	The period within which payments are made is	**One calendar month**		
51.4	The *interest rate* is	**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** **(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 *mutatis mutandis* every 6 months thereafter and as certified, in the event of any dispute, by any manager employed in the foreign exchange department of The Standard Bank of South Africa Limited, whose appointment it shall not be necessary to prove.
6	**Compensation events**	
60.1(13)	The place where weather is to be recorded is:	**As stated in Annexure A to this Contract Data provided by the *Employer*.**
	The *weather measurements* to be recorded for each calendar month are,	**the cumulative rainfall (mm)** **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	**South African Weather Bureau**
	The *weather data* are the records of past *weather measurements* for each calendar month which were recorded at:	**Vaal triangle**
	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 *weather data* for each *weather measurement* for each calendar month are:	**As stated in Annexure A to this Contract Data provided by the *Employer*.** **Note: If this arrangement is used, delete the rows above for 60.1(13) and delete this note.**
7	**Title**	**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.
8	**Risks and insurance**	
80.1	These are additional *Employer*'s risks	**1. Design specifications from the contractor** **2. Delays in delivery** **3. Equipment performance**
84.1	The *Employer* provides these insurances from the Insurance Table	**as stated for "Format A"** *http://www.eskom.co.za/Tenders/InsurancePoliciesProcedures/Pages/EIMS_Policies_From_1_April_2014_To_31_March_2015.aspx* **(See Annexure B for basic guidance)** **The *Contractor's* liability for payment of the *Employer's* insurance deductible shall be limited to the relevant deductibles payable in terms of the relevant insurance policy as at Contract Date.**
84.1	The *Contractor* provides these additional insurances:	**as stated for "Format A"** *http://www.eskom.co.za/Tenders/InsurancePoliciesProcedures/Pages/EIMS_Policies_From_1_April_2014_To_31_March_2015.aspx* **(See Annexure B for basic guidance)** **The *Contractor's* liability for payment of the *Employer's* insurance deductible shall be limited to the relevant deductibles payable in terms of the relevant insurance policy as at Contract Date.**
84.2	The insurance against loss of or damage to the *works*, Plant and Materials is to include cover for Plant and Materials provided by the *Employer* for an amount of	**Replacement including the amount stated in the contract data for the replacement of any plant and materials provided by the *Employer***
84.2	The minimum limit of indemnity for insurance in respect of loss of or damage to property (except the *works*, Plant, Materials and Equipment) and liability for bodily injury to or death of a person (not an employee of the *Contractor*) caused by activity in connection with this contract for any one event is	**whatever the *Contractor* deems necessary in addition to that provided by the *Employer*.**
84.2	The minimum limit of indemnity for insurance in respect of death of or bodily 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	**As prescribed by the Compensation for Occupational Injuries and Diseases Act No. 130 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).**
9	**Termination**	**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.
10	**Data for main Option clause**	
A	**Priced contract with activity schedule**	**There is no reference to Contract Data in this Option and terms in italics are identified elsewhere in this Contract Data.**
11	**Data for Option W1**	
W1.1	The *Adjudicator* 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 www.ice-sa.org.za). If the Parties do not agree on an Adjudicator the Adjudicator will be appointed by the Arbitration Foundation of Southern Africa (AFSA).**
W1.2(3)	The *Adjudicator nominating body* 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 www.ice-sa.org.za) or its successor body.**
W1.4(2)	The *tribunal* is:	**Arbitration.**
W1.4(5)	The *arbitration procedure* is	**the latest edition of Rules for the Conduct of Arbitrations published by The Association of Arbitrators (Southern Africa) or its successor body.**
	The place where arbitration is to be held is	**South Africa**
	The person or organisation who will choose an arbitrator - if the Parties cannot agree a choice or - if the arbitration procedure does not state who selects an arbitrator, is	**The Chairman for the time being or his nominee of the Association of Arbitrators (Southern Africa) or its successor body.**
12	**Data for secondary Option clauses**	
X1	**Price adjustment for inflation**	Escalation adjusted at each payment certificate as a line item.
X1.1(a)	The *base date* for indices is	**TBC- month prior issuing enquiry**
X1.1(c)	The proportions used to calculate the Price Adjustment Factor are:	**10** — **linked to index for** Transport — **Index prepared by** G-1 (Electrical engineering)

	Total	**50**	Labour	G-1 (Building & Construction: Material Purchases for the whole Industry)
		25	Material	G-1 (Mechanical engineering)
		15	**non-adjustable**	
X2	**Changes in the law**	**There is no reference to Contract Data in this Option and terms in italics are identified elsewhere in this Contract Data.**		
X7	**Delay damages**			
X7.1 X5.1	Delay damages for late Completion of the *whole* of the *works* are::		**Completion Date**	
	The total delay damages payable by the contractor does not exceed	**1% of the task order value of the delay per week up to the maximum of 15%**		
X15	**Limitation of the *Contractor*'s liability for his design to reasonable skill & care**	**There is no reference to Contract Data in this Option and terms in italics are identified elsewhere in this Contract Data.**		
X16	**Retention**			
X16.1	The *retention free amount* is	**R0.00**		
	The *retention percentage* is	**5% of every payment made**		
X18	**Limitation of liability**			
X18.1	The *Contractor*'s liability to the *Employer* for indirect or consequential loss is limited to:	**R0.0 (zero Rand)**		
X18.2	For any one event, the *Contractor*'s liability to the *Employer* for loss of or	**the amount of the deductibles relevant to the event described in the insurance policy format**		

	damage to the *Employer*'s property is limited to:	**selected in the data for clause 84.1 above, which policy is available on** *http://www.eskom.co.za/Tenders/InsurancePoliciesProcedures/Pages/EIMS_Policies_From_1_April_2014_To_31_March_2015.aspx*
X18.3	The *Contractor*'s liability for Defects due to his design which are not listed on the Defects Certificate is limited to	**The greater of** • **the total of the Prices at the Contract Date and**
X18.4	The *Contractor*'s total liability to the *Employer* for all matters arising under or in connection with this contract, other than excluded matters, is limited to:	**The total of the Prices other than for the additional excluded matters.** **The *Contractor's* total liability for the additional excluded matters is not limited.** **The additional excluded matters are amounts for which the *Contractor* is liable under this contract for** • **Defects due to his design which arise before the Defects Certificate is issued,** • **Defects due to manufacture and fabrication outside the Site,** • **loss of or damage to property (other than the *works*, Plant and Materials),** • **death of or injury to a person and** • **infringement of an intellectual property right.**
X18.5	The *end of liability date* is	**(i) Seven years after the *defects date* for latent Defects and** **(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.** **A latent Defect is a Defect which would not have been discovered on reasonable inspection by the *Employer* or the *Supervisor* before the *defects date*, without requiring any inspection not ordinarily carried out by the *Employer* or the *Supervisor* during that period. If the *Employer* or the *Supervisor* do undertake any inspection over and above the reasonable inspection, this does not place a greater responsibility on the *Employer* or the *Supervisor* to have discovered the Defect.**
Z	**The *Additional conditions of contract***	

	are	**Z1 to Z12 always apply.**

Z1	**Cession delegation and assignment**	
Z1.1	The *Contractor* does not cede, delegate or assign any of its rights or obligations to any person without the written consent of the *Employer.*	
Z1.2	Notwithstanding the above, the *Employer* may on written notice to the *Contractor* cede and delegate its rights and obligations under this contract to any of its subsidiaries or any of its present divisions or operations which may be converted into separate legal entities as a result of the restructuring of the Electricity Supply Industry.	

Z2	**Joint ventures**	
Z2.1	If the *Contractor* constitutes a joint venture, consortium or other unincorporated grouping of two or more persons or organisations then these persons or organisations are deemed to be jointly and severally liable to the *Employer* for the performance of this contract.	
Z2.2	Unless already notified to the *Employer*, the persons or organisations notify the *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 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.

Z6 Waiver and estoppel: Add to core clause 12.3:

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

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

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.

Z8 Provision of a Tax Invoice and interest. Add to core clause 51

Z8.1 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 in accordance with the *Employer*'s procedures stated in the Works Information, showing the amount due for payment equal to that stated in the payment certificate.

Z8.2 If the *Contractor* does not provide a tax invoice in the form and by the time required by this contract, the time by when the *Employer* 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 *Employer* in terms of core clause 51.2 is then calculated from the delayed date by when payment is to be made.

Z8.3 The *Contractor* (if registered in South Africa in terms of the companies Act) is required to comply with the requirements of the Value Added Tax Act, no 89 of 1991 (as amended) and to include the *Employer*'s VAT number 4740101508 on each invoice he submits for payment.

Z9 Notifying compensation events

Z9.1 Delete from the last sentence in core clause 61.3, "unless the *Project Manager* should have notified the event to the *Contractor* but did not".

Z10 *Employer's* limitation of liability

Z10.1	The *Employer's* liability to the *Contractor* for the *Contractor's* indirect or consequential loss is limited to R0.00 (zero Rand)
Z10.2	The *Contractor*'s entitlement under the indemnity in 83.1 is provided for in 60.1(14) and the *Employer*'s liability under the indemnity is limited.

Z11	**Termination: Add to core clause 91.1, at the second main bullet point, fourth sub-bullet point, after the words "against it":**
Z11.1	or had a business rescue order granted against it.

Z12	**Addition to secondary Option X7 Delay damages (if applicable in this contract)**
Z12.1	If the amount due for the *Contractor*'s payment of delay damages reaches the limits stated in this Contract Data for Option X7 or Options X5 and X7 used together, the *Employer* may terminate the *Contractor*'s 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.

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.

	Weather measurement				
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	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	
February	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	
March	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	
April	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	
May	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	
June	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	
July	To be obtained from SA Weather	To be obtained from SA Weather	To be obtained from SA Weather	To be obtained from SA Weather	

	Bureau	Bureau	Bureau	Bureau	
August	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	
September	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	
October	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	
November	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	
December	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	To be obtained from SA Weather Bureau	

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

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

C1.2 Contract Data

Part two - Data provided by the *Contractor*

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)[2] 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 *Contractor* is (Name): Address Tel No. Fax No.	
11.2(8)	The *direct fee percentage* is The *subcontracted fee percentage* is	**%** **%**
11.2(18)	The *working areas* are the Site and	
24.1	The *Contractor's* key persons are: 1 Name: Job: Responsibilities: Qualifications: Experience: 2 Name: Job Responsibilities: Qualifications: Experience:	

[2] Available from Engineering Contract Strategies Tel 011 803 3008, Fax 011 803 3009 or see www.ecs.co.za

		CV's (and further key persons data including CVs) are appended to Tender Schedule entitled .		
11.2(3)	The *completion date* for the whole of the *works* is			
11.2(14)	The following matters will be included in the Risk Register			
11.2(19)	The Works Information for the *Contractor*'s design is in:			
31.1	The programme identified in the Contract Data is			
A	**Priced contract with activity schedule**			
11.2(20) 11.2(30)	The *activity schedule* is in The tendered total of the Prices is	**(in figures)** **(in words), excluding VAT**		
	Data for Schedules of Cost Components	*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).*		
A	**Priced contract with activity schedule**	**Data for the Shorter Schedule of Cost Components**		
41 in SSCC	The percentage for people overheads is:	**%**		
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	**Minus %**		
22 in SSCC	The rates of other Equipment are:	**Equipment**	**Size or capacity**	**Rate**
61 in SSCC	The hourly rates for Defined Cost of design outside the Working Areas are **Note: Hourly rates are estimated 'cost to company of the employee' and not selling rates.**	**Category of employee**		**Hourly rate**

	Please insert another schedule if foreign resources may also be used	
62 in SSCC	The percentage for design overheads is	**%**
63 in SSCC	The categories of design employees whose travelling expenses to and from the Working Areas are included in Defined Cost are:	

PART 2: PRICING DATA

ECC3 Option A

7

Document reference	Title	No of pages
C2.1	Pricing assumptions: Option A	2
C2.2	The *activity schedule*	5

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:

Identified and defined terms 11 11.2

(20) The Activity Schedule is the *activity schedule* 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;
- 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:

C2.2 the activity schedule

	Description/Functional Area	Unit	Quantity	Rate	Estimated Cost
1	**PRELIMINARIES AND GENERAL**				
1.1	Site establishment	Item	1		
1.2	Health and safety requirements, PPE, medicals and compliance	Item	1		
1.3	Safety file	Item	1		
1.4	Management cost	Item	1		
1.5	Transportation	Item	1		
2	**CIVIL AND STRUCTURAL WORKS**				
2.1	Detailed design - Civil/Structural Engineer (Registered ECSA engineer)	Hrs	12		
2.2	Scrabbling existing concrete surface to remove all impurities	m2	6		
2.3	35MPa concrete in walls	m3	22,5		
2.4	Smooth formwork to sides of walls exceeding 3,5m high but not exceeding 5m high	m2	100		
2.5	Smooth formwork to edges, risers, ends and reveals exceeding 300mm high or wide	m2	18		
2.6	Mild and High tensile reinforcing steel (Allowance of 120kg/m3)	Ton	2,7		
2.7	Supply and install dowel bars to tie concrete floor slab to concrete walls	No	17		
2.8	Galvanized Steel grating Covers	m2	1		
2.9	Test cubes	No	6		
2.10	Waterproofing to floors and internal walls of sump (including corners, joints, and pipe penetrations)	m2	56		
2.11	Average 50mm thick screed to falls	m2	6		
2.12	Supply and apply epoxy coat on screeds	m2	6		
2.13	Preparation and submission of Civil and Structural As-Built Drawings	Item	1		
3	**MECHANICAL WORKS**				
3.1	Detailed design - Mechanical Engineer (Registered ECSA engineer)	Hrs	16		
3.2	Inlet piping modification	m	4,4		
3.3	30 kw 316 stainless steel VFD Submersible pump (160m3/hr @ 6.6m static head)	No	1		
3.4	Discharge HDPE piping to the brine tank inlc. Accessories (based on 150NB discharge size)	m	27,3		
3.5	Overflow HDPE piping to Medium conductivity sump inlc. Accessories (based on 250NB discharge size)	m	13,5		
3.6	Discharge Valve (150NB)	No	1		
3.7	Discharge NRV (150NB)	No	1		
3.8	Inlet butterfly valves (80NB)	No	1		
3.9	Outlet isolation/selection valves (250NB)	No	1		
3.10	Outlet isolation/selection valves (300NB)	No	1		
3.11	Redirecting CIP HDPE pipework (150NB)	m	15		
3.12	Redirecting chemical drain HDPE pipework	m	15		
3.13	Supply and installation of 10NB 316 stainless steel impulse line for PH analyser	m	20		
3.14	250NB HDPE overflow	m	20		
3.15	250NB blank flange	No	1		

3.16	Testing and commissioning of mechanical installation including pump, pipework, valves and overflow system	Item	1		
3.17	Preparation and submission of Mechanical As-Built Drawings	Item	1		

PART 3: SCOPE OF WORK

Document reference	Title	No of pages
	This cover page	1
C3.1	*Employer*'s Works Information	XX
C3.2	*Contractor*'s Works Information	
	Total number of pages	XX

Part C 3.1: Scope of Work

1. Description of the *works*

1.1 Executive overview

Lethabo Power Station Water Treatment Plant (WTP) uses reinforced concrete sumps to collect dirty regen effluents from demineralized and condensate polishing regeneration plants for neutralization. The two (2) Ash Conditioning Sumps (ACS), the Submerged Scraper Conveyor Sump (SSCS) and the Effluent Neutralization Sump (ENS) have deteriorated and need to be repaired to ensure full functionality and to extend its life span to the end of station life in 2041.

To conduct a thorough damage assessment and execute the necessary repairs a long-term outage will be required on the sumps. However, due to operational requirements, it is not possible to take the sumps out of service for an extended period. Therefore, a temporary bypass system will need to be designed and constructed. Figure 1 illustrated the location of the effluent neutralization sump.

This scope of works provides the technical specification that would form part of the contract for Lethabo Power Station. It provides the necessary details to outline the scope of work for the design, manufacture, and construction/installation of the bypass system required to refurbish the effluent neutralization sump.

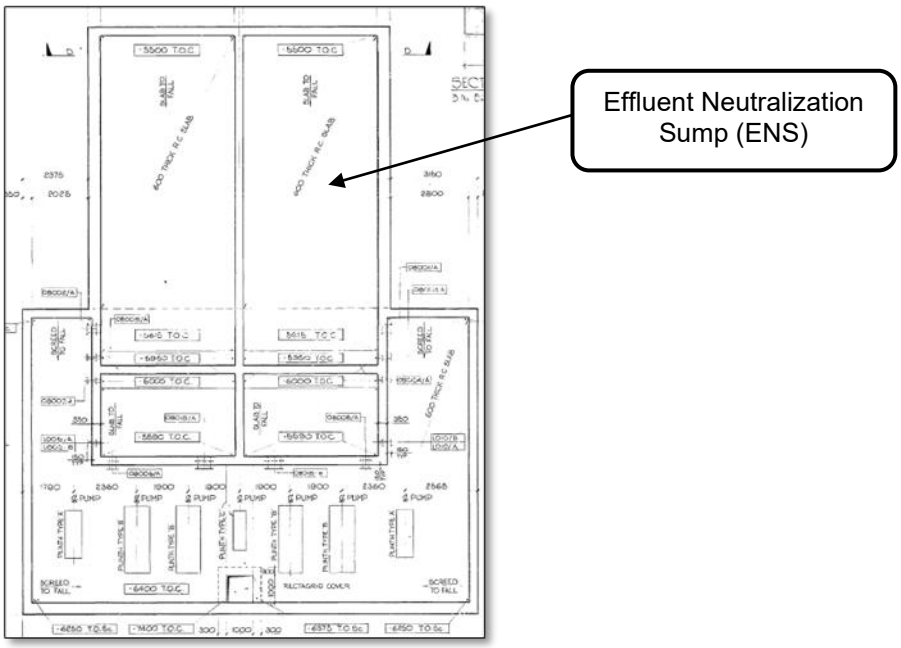


Figure 1: Plan view of effluent neutralization sump

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

Lethabo Power Station is located between Vereeniging and Sasolburg (26.7376°S Latitude, 27.9776°E Longitude in the Free State Province. The station comprises of six 618 MW Units at an installed capacity of 3708 MW. Lethabo's first set of 6 generating units went into commercial operation in December 1985.
Lethabo climatic characteristics are as follows;

- Plant Elevation: 1465 m above sea level
- Barometric Pressure: 85.6 kPa (abs)

The work to be performed by the *Contractor* falls within the following battery limits on Lethabo Power Station.

1.2.1 Mechanical Battery Limits

1.2.1.1 Terminal Points

- Flange on the high conductivity inlet let where temporary sump starts.
- Inlet into the effluent brine tank from the temporary sump pump.
- Brine effluent tank outlet and inlet valves as indicated.
    - 08-10UH31S502 (80NB butterfly valves)
    - 08-10UH31S508 (300NB butterfly valves)
    - 08-10UH31S506 (250NB butterfly valves)
- Overflow from the temporary sump to the medium conductivity sump tie-in with current piping.
- Overflow from brine effluent tank blanked flange to the inlet of the ACS sump.
- Level indicator flange/pipe to the inlet of the ACS sump (pH analyser impulse line for sampling)

1.2.2 Electrical Battery Limits

The electrical battery is limited to the Effluent Neutralization Sump (ENS) and associated LV switchgear, cabling and electrical bonding for the loads defined in Appendix E1- Electrical Load List.

1.2.3 Control & Instrumentation Battery Limits

The Control & Instrumentation scope includes, but not limited to installation of level transmitters, pH measurent, junction boxes, splitter boxes, cabling, VFD interfacing, actuator interfacing with the existing water treatment plant Foxboro Distributed Control System (DCS)

1.2.4 Civil and Structural Battery Limits

The Civil and Structural scope involves the the procurement, design, construct and testing of the temporary effluent sump.

1.3 Interpretation and terminology

The following abbreviations are used in this Works Information:

Abbreviation	Description
BOQ	Bill of Quantity
C&I	Control and Instrumentation
COC	Certificate of Compliance

Abbreviation	Description
ECSA	Engineering Council of South Africa
ENS	Effluent Neatrilsation Sump
ERA	Engineering Risk Assessment
ITP	Inspection Test Plan
NCR	Non-conformance Report
NOD	Notice of Defect
P&ID	Piping and Instrumentation Diagram
OHS ACT	Occupational Health and Safety Act
QA	Quality Assurance
QC	Quality Control
QCP	Quality Control Plan
SANS	South African National Standards
UV	Ultraviolet
VDSS	Vendor Document Submission Schedule
WTP	Water Treatment Plant

Definitions

Automatic	An operation that does not require an operator to adjust and programmed for step-by-step sequence
Baseline	A consistent set of documentation at an established point in time. The document would have been formally reviewed and agreed upon and will serve as a basis for further development.
Basic Design	Describes the Stakeholder needs (with a focus), to be delivered by the proposed business solution requirements in terms of narratives, information flow, business rules, people, application systems and the required governance elements.
Condensate	Refers to condensed steam from process and this is condensed water from the condenser to the boiler.
Demineralised Water	Water that has had almost all of the suspended material and dissolved ions removed.
End-of-phase	A review performed to establish a baseline.
High Pressure, High Temperature (HP/HT) Samples	Samples originating from circuits in which the pressure exceeds 3.45MPa and/or the temperature exceeds 100^{o}C
Low Pressure, Low Temperature (LP/LT) Samples	Samples originating from circuits in which the pressure does not exceed 3.45MPa and/or the temperature does not exceeds 100^{o}C
Sample Conditioning	The physical change induced in an extracted sample, usually continuous that renders it safe for manual collection or suitable or presentation to online chemical monitoring instruments.
Sample Line	The conduit that leads from the sample point to the point of delivery.
Sample , Continuous mode	Where, by design, during normal operation, a sample is delivered to an analyser in a continuous, uninterrupted stream. Where several sample streams are connected, via

	some form of stream switching devices/sequencer, to single analyser that operates continuously, and sampling each stream in turn, these are defined as continuous samples.
System	An integrated set of constituents parts that are combined for an operation
Chilled Water Circuit	A chilled water circuit consist of a pump (MOT-105), evaporator, piping, pipe fittings and the sample cooler. This can either be an open or closed circuit used to supply water at a temperature of 24.8°C with a variance of ±1°C to the sample cooler.
Cooling Water Circuit	A cooling water circuit consist of a condenser, water regulating valve, piping and pipe fittings. This circuit is vital in cooling the refrigerant in the condenser. Without this circuit the refrigerant (working fluid) will not complete the cycle.

2. Management and start up

2.1 Management meetings

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 review	Every Monday at 10:00	Projects Boardroom	Contractor SHE Officer and Project Manager
Tool box sessions	Every-day before commence of work	Site	All the Contractor's employees.
Compensation events	As and when required	To be confirmed	Employer's and Contractor's Representatives
Overall contract progress and feedback	Every Monday at 08:30	Projects Boardroom	Employer's and Contractor's Representatives

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.

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.

2.2 Documentation control

Documentation requirements cover the life cycle of the project from the initial engineering stages through to handover and include operating, maintenance and the training documentation. Not only must these documents be comprehensive and complete but must comply with strict document control and revision procedures.

The *Contractor* plans the supply of the documentation during various project stages and provides the documents in accordance with the key scheduled project milestone dates. All engineering documentation is

submitted as per the VDSS. A document is thus any written or pictorial information describing, defining, specifying or certifying activities, requirements, procedures or results.

All the drawings issued by the *Employer* for this contract is copyright protected and are not to be copied by the *Contractor*.

The *Contractor* submits all documentation on a formal transmittal form in triplicate to the *Project Manager.* All manuals, documents and engineering documentation shall be presented in British English.

The documents submitted is required to comply with the *Employer's* requirements. Where relevant, Eskom templates are to be used. Documents are to be submitted in PDF as well as editable form.

2.2.1 Documentation Management System

A comprehensive documentation management system is provided. All documentation is maintained and updated until *Completion*. Any change is propagated automatically to all related documentation. All documentation forms an integral part of the documentation system.

The AKZ plant position codes are identified in the documentation. AKZ codes, down to third level, are to be used. The *Contractor* includes the *Project Manager* accepted drawing head on all drawings submitted to the *Project Manager*. The format of all documents is submitted to the *Project Manager* for acceptance.

Automatic prevention of duplication of numbering or ambiguity is built into the system.

2.2.2 Documentation Management

The *Contractor* implements a comprehensive document control system for all documents, their revision status and of the document status in relation to the "as built" and "as designed" plant status. Procedures, document control, flow diagrams and indexes are included in this system. The drawing register contains the following information and is submitted monthly, in a Microsoft Excel format, to the *Project Manager*:

- Drawing number (*Employer* and makers number)
- Revision
- Approval status
- Location of drawing at that stage
- Drawing AKZ number
- Drawing description
- Sheet number
- Transmittal number

2.2.3 CAD Systems

The *Employer* uses an Intergraph Micro Station as the CAD system. All drawings supplied under this contract will be in the required Micro Station CAD format

Acceptance is obtained from the *Project Manager* for the format, content, layout and quality of all drawings supplied as part of the *Works* and is included in the documentation synopsis.

At the completion of the last stage of the w*orks*, the *Contractor* supplies a copy of uncompressed data files reflecting all latest revisions of all drawings. Any programme software licenses and agreement for software packages that are used for the *works* form part of the *works* and are handed to the *Project Manager*.

2.2.4 Cabling Documentation

The *Contractor* provides the cabling documentation for the control and power cable for the monitoring and protection systems. The *Contractor* provides the cable schedules inclusive of origin, target, type and size specification for all new cables required for the *Works*. The *Employer* assists with the assignment of cable numbers for all cables installed.

The *Contractor* provides a cable management system for duration of the *works*, for acceptance by the *Project Manager.*

The *Contractor* provides the termination schedules for all cables that form part of the *works*. The *Contractor* transfers all cable schedule information in electronic format (MS Office). A printout of the cable information contained on the disk serves as the official documentation.

The cable information supplied by the *Contractor* should also include all the relevant information regarding the cables that are decommissioned as part of the *Works.*

2.3 Health and Safety Risk Management

The *Contractor* shall provide a health and safety plan based on *Employer's* Safety, Health and Environmental (SHE) Specification,

2.3.1 General

The *Contractor* complies with the following:

- Lethabo Power Station Health and Safety Standards as per Lethabo Power Station Health & Safety Specifications for Contractors (PA/270/003) attached to the Invitation to Tender. This procedure will be handed over during tender enquiry and will enable the successful Tenderers to compile a Health & Safety plan that has to be approved by the Employer prior to commencement of work.
- Compliance with Eskom No Smoking Policy
- Adhere to the OHS Act 85 of 1993
- All staff will undergo Safety Induction, presented by Lethabo Risk Management Department

Employer's site regulations as stipulated in Form PA/270/003, covering the following:

- Clean lines
- Storage of material
- Safety precautions and fire prevention
- Permits to work
- Other Contractor's work
- Representation of sub-Contractors
- Maintenance staff to witness erection
- Supervision
- Handing over of works
- Contractor's Site

2.3.2 Health and Safety Plan (Construction Regulations)

The following is required after contract award:
The *Contractor* compiles a Health and Safety Plan, filed in a Health and Safety File, comprising of the following:

- Proof of the contracting company's own Health and Safety Policy
- Proof of appointments, assignments and designations as required in terms of the Occupational Health and Safety Act, No 85 of 1993
- Proof of Risk Assessments regarding Hazards identified and proof of training of own employees regarding controls derived from the risk assessment
- Proof of Safe Work Procedures that derived out of the Risk Assessments
- Proof of the contracting company's own Emergency Plan that will deal with their own emergencies on site
- Proof of a Fall Protection Plan, if required to perform work at elevated levels developed by a competent person appointed by the contracting company
- Proof of "Notification to perform Construction Work" – a copy of the notification addressed to the Department of Labour as required Regulation 3 of the Construction Regulations
- Proof of an Induction Program (it is advised that the Lethabo SHE Rules as a Guide) and an attendance register signed by its employees prior the commencement of any construction work on site.
- Proof of the contracting company's employees Medical Fitness Certificate. (Must still be valid – one year. May only have been issued by an occupational health practitioner)
- Proof of contractors weekly Health and Safety Rep Inspections regarding its own site and where detached work is performed
- Proof of Personal Protective Equipment (PPE) issued to Contractor's employees.
- Proof of contracting company's Accident/Incident Reporting and Investigation System
- Proof of checklists and where applicable test certificates, regarding contractor's tools, equipment, machinery, mobile equipment, vessels under pressure and any other applicable checks required by the Act
- A "Section 37(2) Agreement with Mandatory" needs to be drawn up by the Employer and co-signed by the Contractor before work can commence
- The Contractor shall ensure that his Subcontractors do also have a Health and Safety File and that it must be accepted by the Contractor.
- The Safety Officer employed by Lethabo Power Station will audit these Health and Safety Plans to ensure compliance with the provisions of the Act.

2.3.3 SHE Documentation Required from the *Contractor* at Tender

The *Contractor* provides the following documents in terms of Health, Safety and Environmental performance with the tender. Should the *Contractor* not provide this information it will be assumed that it does not exist:

- Letter of good standing with COID or any insurance body
- An Organogram indicating the names of all persons that will hold legal appointments on the project in terms of the Act
- The expected roles, responsibilities and authority of those who are proposed to receive legal appointments
- Provide an overview of the system / program that is utilized to manage Safety, Health and Environment

2.3.4 Occupational Health and Safety Act 1993, Section 37

The *Contractor* complies with the following:

- The Occupational Health and Safety Act, 1993, and all Regulations made there under.
- All Employer Safety and Operating Procedures, which are attached hereto.

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 have received sufficient safety training to ensure that they can comply therewith.

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

The *Contractor* shall appoint a person who will liaise with the *Emp*loyer Safety Officer responsible for the premises relevant to this contract. The person so appointed shall on request:

- Supply the *Emp*loyer Safety Officer with copies of minutes of all Health and Safety Committee Meetings, whenever he is required to do so.
- Supply the *Emp*loyer Safety Officer with copies of all appointments in respect of Employees employed on this contract, in terms of the Act and Regulations and shall advise the *Emp*loyer Safety Officer of any changes thereto.

*Emp*loyer may, at any stage during the currency of this agreement be entitled to:

- Do safety audits at the *Contractor's* premises, its work places and on its Employees.
- Refuse any Employees, sub-*Contractor* or agent of the *Contractor* access to its premises if such person are found to commit any unlawful act or any unsafe working practice or is found to be not authorised or qualified in terms of the Act.
- Issue the *Contractor* with a work stop order or a compliance order should *Emp*loyer become aware of any unsafe working procedures or conditions or any non-compliance with the Act, Regulations and Procedures by the *Contractor* or any of its Employees, sub-*Contractor*s or agents. Stoppages of this nature will not constitute a compensation event.

2.3.5 Occupational Health And Safety Act 1993 additional information

- The Medical Station is available on site during normal working hours. The afterhours emergency telephone number is **5555** or from a Lethabo phone the extension is **5555** that can be phoned for assistance.
- Fire protection and rescue services are available on site 24 hours per day.
- The Contractor must comply with Lethabo Power Station Contractors Safety Manual. This manual is available on request from the Employer’s Representative.
- The Contractor and his sub-contractors must comply with Eskom’s Non Smoking Policy.
- The Contractor and his sub-contractors must comply with the Occupational Health and Safety Act85 of 1993.
- The following will be an advantage
- NOSA accreditation.
- NOSA MBO system in place.
- The Contractor is not allowed to weld onto any steam piping, working structures or plant.
- The Contractor must appoint Safety Representatives to assist the Employer’s Representative to:

- Identify possible hazards, dangers and risks.
- Ensure potentially and actions are mitigated.
- Ensure a safe working environment.

- The Employers Representative shall be entitled to request the Contractor to stop work, without penalty to the Employer when the Contractor fails to conform to the prescribed and accepted health and safety standards or contravene the health and safety sections and regulations.
- The Employer's Representative must be informed within 24 hours of any injury or damage to property or equipment.

2.3.6 Housekeeping

Working areas are cleaned daily. All electrical cables and hoses are routed so as to not cross over floors and walkways. All equipment is packed neatly without interference to access. All excess scaffolding material is removed from working areas after the scaffolding has been erected. Scrap bins are available on the zero meter level and emptied daily by the *Employer*.

2.3.7 Barricading

Access to danger zones is done using handrail type guards of at least 1,2 meters high, able to block access to the danger zone. Symbolic safety signs depicting "Danger" and "No entry" are attached to the guards.

2.3.8 Radiographic examinations

When radiographic tests are performed in the plant, the danger area is barricaded. Workers are made aware of this fact and the Radiographic technicians ensure that no person is within or enter the danger area prior to commencing of or during the tests by public announcement according to the procedure. See relevant procedure PA/272/001.

2.3.9 Scaffolding

All scaffolding erected complies with procedure PS/031/001. At least one person in the *Contractor's* service shall be competent to inspect scaffolding in the case where the *Contractor* himself needs scaffolding. Certificates must be handed in at the *Project Manager* after contract award. The *Contractor* is responsible for the supply, erection and dismantling of scaffolding.

2.4 Environmental constraints and management

2.4.1 Hazardous Waste

All waste introduced to and/or produced on *Emp*loyer's Premises by the *Contractor* for this order, 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 1994 Ref.: BN0621-16296-5. (A copy of this document is available at the Power Station for reference purposes).

2.4.2 Environmental Management

Lethabo has an Environmental Policy, to which the *Contractor* and his employees must adhere. It is the responsibility of the *Contractor* to ensure that he obtains copies of the Lethabo Environmental Policy, the legal register applicable to his area of responsibility, the aspect register and the Lethabo procedures (applicable to the *Contractor's* area of responsibility) and to familiarize themselves on such procedures, within 30 days from the date of commencement of work at Lethabo, to assist the *Contractor* and his/her employees to prevent pollution and to comply with legislative requirements. Copies of the above-mentioned documents shall be obtained from the *Project Manager* or Environmental Officer on the first day prior to

commencement of work at Lethabo. The *Contractor* shall submit proof to the Environmental Officer of Lethabo that he and his employees has done all the necessary training on procedures and Policies supplied to them and that they do understand the contents of the procedures, registers and policies and will adhere to them at all times.

The *Contractor* adheres to the following rules:

- Provide sufficient storage containers, labelled depicting general or hazardous waste and store in a designated storage area
- No hazardous waste may be stored for a period of more than 90 days on the Lethabo premises.
- Ensure that all hazardous waste is disposed off at a licensed Class H disposal site. A copy of the hazardous waste disposal certificate is submitted to the Project Manager.
- Ensure that all other general waste is disposed off at the local municipal waste dump
- Ensure that the *Contractor's* site does comply with the general good housekeeping practices. Redundant materials are moved to allocated sites. No scrap shall be stored in the *Contractor's* yard. Scrap is to be cleared from Site daily.

The non-adherence to the Lethabo Environmental policy and rules could result in the termination of this contract.

2.5 Quality assurance requirements-

2.5.1 Quality Management System

The *Contractor* shall conforms to quality requirements as per ISO 9001:2015 and Supplier Quality Management Specification 240-105658000 (also known as QM58). If the *Contractor* is registered, the appropriate ISO 9001:2015 Registration certificate of comformance must be supplied with the tender.

The *Contractor* further ensures that the subcontractor's programmes comply with the requirements of the Works Information.

The *Contractor* notifies the *Project Manager and Project Quality Inspector* of any changes to the Quality System and obtains agreement prior to implementation on existing orders and contracts, or sub orders and sub contracts.

2.5.1.1 Quality Documents Submitted with the Tender

The *Contractor* submits a copy of ISO 9001:2015 certificates, Quality policy and quality system procedures relevant to the *Works*.

The *Contractor* also submits a typical quality control plans related to the project and competence of the project team .

The *Project Quality Inspector* evaluates the *Contractor*'s capabilities with regards to quality assurance and quality control based on these submissions and the performance history of the *Contractor*. The *Project Manager* performs pre-award assessments where necessary, giving further information to aid the selection process.

2.5.1.2 Quality Documents Submitted after the Contract Date

Contractor submits a fully detailed Quality Assurance Programme (QAP) for acceptance by the *Project Manager* within four weeks of the *Contract Date*. Documents are submitted for review and acceptance by the Project Manager within 30 days after the *Contract Date*, prior to the commencement of work

The documents submitted by the *Contractor* shall include the following:

- Copy of the Quality Manual
- Copy of the Quality System Procedure(Control of subcontracting, Non conformance, control of records and documents and Corrective action)
- Copy of the Contract Project Quality Management Plan
- Copy of Quality Control Plans related to projects
- Project Method Statement
- Copy of the proposed index of the QA/QC, inspection and test records

The *Contractor* shall submit the quality report on a montly basis including a list of the following :

- Monthly updated sites and pre-sites programs
- Completed inspections and outstanding inspections
- Non-conformance Reports, Corrective Actions and Preventative Actions, Concessions . ect
- Project Risk register

2.5.1.3 Contract Project Quality Management Plan Requirement

The Contractor submits a fully detailed Contract Quality Plan (CQP) for acceptance within 30 days of the Contract Date.The *Contractor* prepares a contract quality management plan that, where appropriate, indicates the following:

- Indicates the interface with the *Contractor's* quality system and applicable documents such as procedures and work instructions
- Establishes communication channels between the *Contractor* and the *Project Manager* in respect of quality and the integration of such with prescribed contract communication channels
- Indicates how specific subcontractors will be monitored
- Identifies items or activities for which quality control plans will be prepared
- Identifies the specifications, drawings and acceptance criteria for material for which quality control plans are not required
- Identifies the areas or processes requiring special controls
- Identifies the *Contractor's* Management Representative and personnel responsible for the control of quality activities and their relationship to the *Contractor's* management structure
- Identifies the documents which are to be submitted to the Project Manager
- Identifies the *Contractor's* quality monitoring programme

The *Contractor* periodically updates the contract quality management plan to reflect changes in any of the above details. The frequency of such updates is determined by the *Project Manager* but will not be greater than one year.

2.5.1.4 Quality Control Plan

The *Contractor* quality control plans cover inspection and test proposals for items or activities to be supplied as part of the *works*.

The quality control plan indicates the following as appropriate:

- The identification of the items/ activities
- Approval of the welding procedures and the material
- A list of the sequence of operations including welding activities , inspections and tests
- The identification of the specification, drawings or procedures for each operation
- The acceptance criteria with reference to the appropriate technical specification, in-house, national or international standard and relevant clause number
- The inspections and tests the *Contractor* has nominated for hold and witness points
- Provision for inspections and tests nominated by the *System Engineer , Quality Inspector and AIA*
- Provision for inspection status indication
- Inspection and test records that are generated by the *Contractor*

The quality control plans are reviewed by the *System Engineer, Quality Inspector and AIA* to allow for insertion of his specific requirements, including hold and witness points, prior to commencement of work. The *Contractor* does not commence work until the *System Engineer, Quality Inspector and AIA* accepts. No site work and designs are allowed unless the Employer accepts the CQP and QCPs/ITPs.

2.5.1.5 Access to the *Contractor's* and *Subcontractor(s)* Premises and Facilities

The *Contractor* is responsible for defining the level of QA/QC or inspections to be imposed on the sub-contractors and suppliers of all materials. This level should be based on the criticality of equipment and be submitted to the *Project Manager* for acceptance in a form of a QCP or ITP.

2.5.1.6 Inspection and Testing

The *Contractor* utilises the *Employers'* quality documentation forms for requesting access, erection checks etc. The request forms must be submitted to the supervisor at least within 72 hours notification for off-site but local (within the country), 15 days for offshore (where applicable) and on-site inspections 24hrs notification coordinated quality team and the supervisor.

The *Contractor* ensures that all work has been fully inspected, accepted and documented prior to requesting any inspection by the *Supervisor*.

2.5.1.7 Quality Records

- The *Contractor* prepares and submits to the *Project Manager* an Index of QA/QC and inspection and test records prior to the commencement of work.
- The *System Engineer and Quality Inspector shall* determines which documents are to be submitted during the performance of work and reviews the index and request changes if required. The *Contractor* conforms to the Index approved by the *System Engineer and Quality Inspector .*

- The *Contractor* ensures all records identify the items, equipment and/or activities to which they pertain and collates indexes and securely stores the records in such a manner that they are readily retrievable.
- The *Contractor* implements appropriate administrative controls to limit access to prevent inadvertent loss of or damage to records.
- The *Contractor* stores all quality records. The *Contractor* only destroys or discards quality records with the approval of the *Project Manager, System Engineer and Quality Inspector*.
- *Apart from the statutory data packages required, the Contractor* also compiles a data package (data-book), of the relevant drawings, test certificates, etc. for each section of work which must be reviewed and signed off by the *Supervisor/QC Inspector* prior to the commissioning phase..

2.6 Programming constraints

2.6.1 General

a. Planning and control of the works is to be done by the *Contractor* in line with the accepted Work Breakdown Structure.
b. A single programme is to be used for planning of the Works, incorporating the programmes of all sub-contractors.
c. Interface points with sub-contractors and Others, including interfacing between different subcontractors
and Others are to be clearly identified.
d. Project Key Milestone Dates (stated in the contract data) as supplied by the Project Manager are to be incorporated into the programme by the Contractor.
e. Most of the site work will be outage related and will therefore have to fit into the outage duration. Due to the nature of the industry and production demands, the outages are prone to movement.

2.6.2. Computerised planning and reporting

a. Primavera Project Planner shall be used for computerised planning. MS Projects will also be acceptable for programme submission only for tendering.
b. Primavera Project Planner (latest version) is exclusively to be used for all planning, progress monitoring and reporting of the works during project execution.

2.6.3. Additional programme requirements

a. A level 4 (up to level activity) programme is to be submitted with the tender documentation. The CPM (Critical Path Method) technique is to be used for planning programme.
b. The programme shall be free of obvious errors related to sequence or timings of the Works.
c. The execution philosophy, programme and planning methodology is to be described in the programme/ schedule basis document for submission together with the tender documentation.
d. The programme submitted at tender must be resource loaded.
e. A programme is required in order to complete this project in 10 calendar days for installation.

2.6.4. Planner requirements

a. The planner appointed for this contract is seen as a key person and his name is to be included into the Contract Data by the Contractor.
b. It is a requirement of this contract that the planner is sufficiently experienced and well qualified to perform the requirements of the programme in order to meet deadlines set by the *Employer.*.
c. The Contractor shall provide the Project Manager with a weekly update on the programme.

2.7 Contractor's management, supervision and key people

The *Contractor* is to provide a detailed organogram at tender. The organogram must clearly indicate the employee's details. In the event of any person within the Contractor's organogram changing, the *Contractor* is to obtain approval for the replacement from the *Project Manager.*

The *Contractor* shall provide his own responsible person as required by the Permit to Work system on site during the duration of the works.

2.8 Invoicing and payment

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.

The *Contractor* shall address the tax invoice to
Lethabo accounts payable section (APS).
Private Bag x 415
Vereeniging
1930

Alternatively email it to:

The total Price for Work Done to Date which the *Contractor* has completed;

- Other amounts to be paid to the *Contractor*;
- Less amounts to be paid by or retained from the *Contractor*;
- The change in the amount due since the previous payment being the invoiced amount - excluding VAT, the VAT and including VAT;
- The original copy of an invoice shall be send to the *Employer*'s accounts payable section (APS).

2.9 Contract change management

The change management process for addressing changes on the contract will be as follows;

- All requests for contract changes shall be submitted in writing by the Contractor to the Project Manager as per the terms and condition of the contract.
- The Project Manager will follow the prescribed requirements for managing contract changes as per his/her delegation of authority.
- Changes that are not within the delegated authority of the Project Manager will be submitted for approval to the relevant adjudicating authority in accordance with Procurement and Supply Chain Management Procedure, 32-1034.

The Contractor shall ensure that all approved changes are documented and kept as record.

2.10 Constraints on how work will be conducted

- All scaffolding and rigging requirements shall be the responsibility of the contractor.
- The *Contractor* shall be responsible for supply of all the equipment and tools to conduct the works.
- The *Contractor* shall ensure that all electrical equipment are tested and accompanied by COC or proof of tests certificates before connections to Eskom supply is permitted.
- The *Contractor* shall ensure that all high pressure high temperature equipment and pressure vessels are equipped with 3.2 material certificates, full traceability and *AIA* involvement.
- The construction price on the price list should cater for equipment, tools, scaffolding and rigging cost.

- The warranty for the works shall start from the day after successful commissioning onwards.
- The *Contractor* shall submit proper off-loading procedure two weeks before equipment delivery to the *Employer's* site.
- The *Employer* design acceptance process can take up to four weeks and this time must be catered for by the *Contractor* in the plan.
- The contractor shall ensure that the permit to work is issued by the Employer's responsible person before commencing work in any specific area covered under this scope of work.
- The *Contractor* shall appoint two or more competent persons as authorized supervisors who shall undergo five days authorized supervisor training.
- The *Contractor's* authorized supervisor would be responsible to carry out duties outlined in the Eskom plant safety regulations.
- The *Contractor* shall allow in his program, 10 days for the authorized supervisor training and panel interview prior to commencing with the works on site.
- During works, the employer shall do random SHERQ audits.
- The contractor shall adhere to the agreed schedule, and apply project management principles to avoid delays.
- No work shall commence without the supervision and or availability of key personnel on site as required by the legislation.
- The contractor shall carry out the works according to the specifications and designs provided by the *Employer*
- The Contractor's deployment of key personnel on site shall be strictly in line with the requirements of the *Employer's* technical requirement criteria.
- Normal working hours must be maintained as far as possible. The normal working hours on site will be from 07:30am to 16:30pm Monday to Friday. Should the *Contractor* wish to work outside these normal working hours, he should notify the *Project Manager* in writing.
- The *Contractor* will only be allowed to work outside the specified hours once the *Project Manager* has approved the request in writing.
- All provisions of the Occupational Health and Safety Act, 85 of 1993, and any other applicable legislation, must be adhered to.
- No equipment shall be provided by the Employer for the works
- The installation and commissioning can only be done during plant outages.
- If the outage is deferred, the installation shall be postponed until that specific outage time.
- The *Contractor* shall notified through Early Warnings if the outage is deferred, since the deferments are beyond the Employer's control.

2.11 Training workshops and technology transfer

2.11.1 General

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*.

Training provided by the *Contractor* is directly applicable to the actual equipment supplied for the *Works*. Generalised training based on similar equipment is not acceptable. All training will consist of both theoretical and practical training. The training is to be structured such that competency tests are done at the end of the training sessions on all the training participants.

The local facility for training provided by the *Employer* is suitably sized air-conditioned room that accommodates six to ten trainees as well as trainee and trainer desks, an overhead projector and flipchart or white board. Lethabo Engineering and Maintenance personnel should be adequately trained to be able to maintain the new equipment over its entire design life.

At design freeze, the *Contractor* submits to the *Project Manager* for acceptance a detailed training programme as well as a prospectus for each course. The training schedule is incorporated in the Accepted Programme.

Training is scheduled such that at full scope training courses are provided, as a minimum, after the completion of each unit, to accommodate all relevant personnel as required.
A certificate of satisfactory completion to be issued to employees who successfully completed the training.

The *Employer*'s training requirements are as follows:

- The Provision of detailed training manuals incorporating all aspects of the training that will be provided to the Project Manager for acceptance.

- Initial training of *Employer*'s personnel in the operation, calibration and maintenance of the works.

- The *Contractor* provides formal theoretical training to the *Employer*'s personnel in the operation, maintenance and general running of the Works and equipment before commencing testing and commissioning of the works. The disciplines to be trained are operating, maintenance (electrical, mechanical, control and instrumentation), engineering and chemistry personnel. The *Contractor* shall present sufficient training interventions to accommodate all above-mentioned personnel.

The following is considered to be the minimum requirements for such training:

a) Theory of processes
b) Plant and component description, layout and design
c) Controls, interlocks and alarms
d) Plant operation and control:
    I. Pre start up procedures
    II. Start-up procedures
    III. Normal operating procedures
    IV. Routine test and inspection procedures
    V. Normal and emergency shutdown procedures
    VI. Emergency and alarm conditions
    VII. Cleaning procedures
    VIII. Long-term storage procedures
e) Operational problems:
    I. Troubleshooting
    II. Loss of supply (e.g. electrical power)
f) Dangers and precautions
g) Recommended settings (electrical, mechanical, control and instrumentation)
h) Test and inspection plans (electrical, mechanical, control and instrumentation)
i) Inspection and Maintenance Procedures (electrical, mechanical, control and instrumentation):
    I. During plant operation
    II. During shut down periods
j) Special tools and equipment:
    I. Requirements
    II. Training
k) Fault Finding:

I. Items to inspect
II. Typical observations and/or deviations
III. Recommended corrective actions

l) Recommended spares (electrical, mechanical, control and instrumentation):
I. Item description
II. Part number/type
III. Supplier
IV. Drawing designation
V. Quantity installed on plant
VI. Recommended stock

m) Lubrication schedule
e) Items to inspect
f) Typical observations and/or deviations
g) Recommended corrective actions

During the testing, commissioning and handing over of the works, it is also incumbent on the *Contractor* to provide practical training to the *Employer*'s personnel in the operation, maintenance and general running of the works and Equipment. For this purpose the Project Manager reserves the right to allocate certain staff to the *Contractor*'s team during erection and commissioning period.

The *Contractor* declares the staff as competent, in writing, to operate, calibrate and maintain the *Contractor*'s plant and equipment prior to hand over or provide supervision for the period.

2.11.2 Training Documentation

The *Contractor* provides all course material including manuals. All course material is in English and includes all third party documentation. A copy of the training documentation is supplied to each trainee with an additional 3 master sets for the *Employer's* library and training department. All training material is also supplied in an electronic format for easy reference.

Training manuals are continuously updated by the *Contractor* up to the date of issue of the Defects Certificate for the whole of the *works*.

2.11.3 Operating, Maintenance and Engineering Training Manuals

The *Contractor* provides Operating, Maintenance and Engineering Training Manuals.
The quantity of manuals to be supplied is as follows:

- Synopsis (Manual) - 1 copy
- First Draft - 1 copy
- Final Draft/Pre Print Proof - 1 copy
- Final Manual - 5 copies

All documentation is also to be handed over in an electronic format for easy reference.

2.11.4 Participation of Employer's Staff

The *Employer* intends to second staff, both engineering and maintenance, part-time or full-time to the *Contractor's* team during the engineering, installation and commissioning stages of the contract, without affecting the Prices. The aim is that the *Employer's* personnel receive "on-job" training in order to become familiar with the equipment forming part of the *works*.

3. Engineering and the Contractor's design

The purpose of this Works Information is to state the Employer's requirements and provide the Contractor

with the necessary information to submit a comprehensive tender.

3.1 Employer's design

This document provides the scope for the design, procurement, fabrication, delivery to site, erection, modification of existing infrastructure, cold and hot commissioning, performance testing of the entire engineering works to ensure a fully functional Effluent Neutralisation Sump Temporary bypass system at Lethabo Power Station , herein after referred to as the *Works*. The *Contractor* supplies all plant and equipment for the execution of the *Works*.

The *Contractor* is responsible for carrying out all activities and supplying everything necessary to provide the *Works* in accordance with the requirements of the Works Information.

The *Contractor* ensures that the complete design is performed by, or under the direction, control and supervision of an Engineering Council of South Africa (ECSA) registered professional person for each discipline as required by the scope of the design. The professional person(s) shall be responsible for signing off the design as applicable to his field of registration.

The *Contractor* is required to perform a plant walk down and evaluates items described in the *Works* for inclusion in tender submission. The *Contractor* is required to develop a detailed design for acceptance by the *Employer*. The *Contractor* is required to adhere to Generation Plant Safety Regulations for all *Works*. The *Contractor* is required to adhere to the applicable Eskom and SANS Standards..

3.1.1 General Design Requirements

Lethabo Power Station Effluent Neutralization Sump has been identified as the most critical sump requiring an assessment and repairs. Previous inspections of the sump have found that the corrosion protection lining has failed and the concrete in some areas of the sump has been compromised. This is in part due to the harsh environment inside the sump (effluent is corrosive) and the unavailability of the plant to conduct the required planned maintenance. The sump has experienced several leaks which have been repaired, however the integrity of the sump walls is questionable. There is a risk that continued operation of the sump without conducting the necessary assessments and repairs may result in a total failure of the structure. The temporary bypass system will therefore be designed specifically for this sump.

The effluent neutralization sump (ENS) is a reinforced concrete structure situated within the water treatment plant. It is an underground sump with approximate dimensions of 21,500 mm (length) x 16,700 mm (width) x 7,400 mm (height). The sump comprises a 600 mm thick concrete floor slab, coated with screed to facilitate the gentle drainage of effluent. Its sidewalls are 450 mm thick and support a 200 mm thick roof slab. The

sump is divided into compartments for effluent collection, storage, and the installation of electrical pumps. Refer to Figure 2 which illustrates the cross-sectional view of the sump.

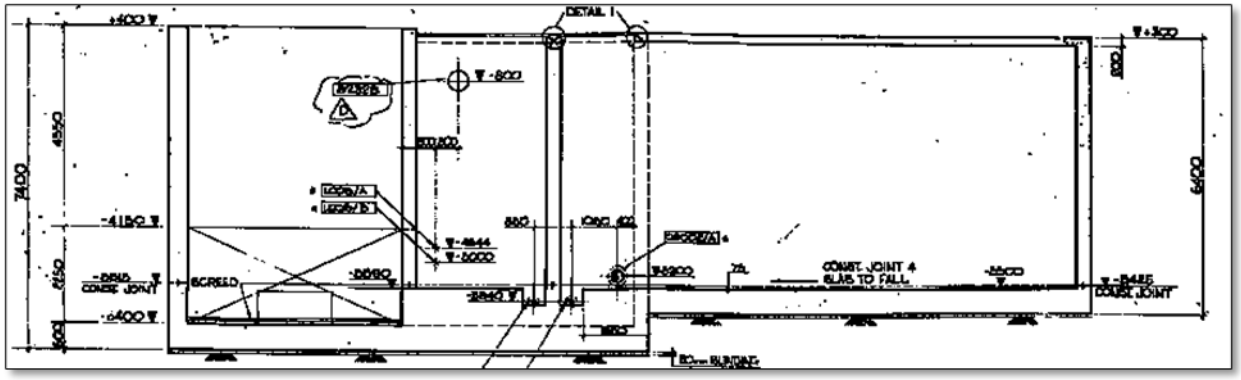


Figure 2: Cross-sectional view of EN Sump

3.1.2 Design Criteria

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3.1.3 Civil & Structural Requirements

The civil and structural scope for the project includes the procurement, design, construct and testing of the temporary effluent sump, whereby all *works* are to be undertaken by the appointed *Contractor*.

3.1.3.1 Temporary Effluent Sump

1. The *Contractor* is required to design and construct a new temporary effluent sump within the pipe trench located adjacent to the EN sump.
2. The construction material for the temporary effluent sump can be either steel or reinforced concrete. The choice of construction material will be based on the *Contractor's* design and ease of construction of the sump.
3. The *Contractor* is required to assess the available space within the pipe trench to accommodate the temporary effluent sump.
4. The overall dimensions of the sump will be based on the available space within the pipe trench and the required flow rate.
5. The temporary effluent sump is to be designed to accommodate the electrical, mechanical and C&I requirements as stated in the Works Information.
6. Structural steel gratings are to be installed on the top of the effluent sump. Such gratings are to be designed to resist the imposed loads from maintenance activities.
7. The interior surface of the temporary effluent sump is to be coated with an acid resistant liner. Datasheets are to be submitted to the *Project Manager* for review and acceptance prior to being utilised.
8. The effluent sump is to be constructed/positioned away from the pipe trench wall to ensure that spillage occurs within the pipe trench.

9. The *Contractor* is required to conduct a water tightness test on the new temporary effluent sump. All defects observed during this test is to be rectified by the *Contractor*.
10. Prior to the construction of the effluent sump, the concrete surface of the pipe trench is to be assessed and repaired. As a minimum, 50mm of the concrete surface is to be removed and replaced with 35 MPa non-shrink grout.
11. The surface area of the concrete to be repaired will be based on the footprint of the effluent sump.
12. The *Contractor* is require to conduct a structural verification for the concrete floor slab of the pipe trench to determine that integrity of the structure is not compromised by the new temporary effluent sump.
13. All *works* are to done in accordance with the *Employer's* standard and relevant SANS codes.

3.1.4 Electrical Requirements

The electrical scope includes the procurement, design, manufacture, delivery, storage and preservation, off-loading, installation, site testing, decommissioning and commissioning, quality control, training and handover of a safe, integrated and fully functional electrical system , within the Contractors scope boundaries and Employers requirements.

3.1.4.1 Electrical System Battery Limits

The electrical battery is limited to the Effluent Neutralization Sump (ENS) and associated LV switchgear, cabling and electrical bonding for the loads defined in Appendix E1- Electrical Load List.

3.1.4.2 Applicable Electrical Standards, Specifications, Procedures and Schedules

1. 240-56227443 Eskom Requirements for Control and Power Cables for Power Stations Standard
2. 240-57617975 New Low Voltage Motors Procurement Standard.
3. 240-56361435 Transport of Power Station Electric Motors Standard
4. 240-77100923 Low Voltage Motors Schedule B Appendix C2
5. 240-132875144 LV AC VFD Technical Schedule A&B Appendix C2
6. 240-56356396: Earthing and Lightning Protection Standard
7. SANS 61800-2 Adjustable speed electrical power drive systems Part 2: General requirements — Rating specifications for low voltage adjustable frequency A.C. power drive systems
8. SANS 61800-3 Adjustable speed electrical power drive systems Part 3: EMC requirements and specific test methods.
9. SANS 61000-2-4 Electromagnetic compatibility (EMC) Part 2-4: Environment: Compatibility levels in industrial plants with low frequency conducted disturbances.
10. 380V Water Treatment Plant Board 1B Switchgear Schedule 0.63/5057 Sheet 7 .
11. 0.63/8297 Sheet 4 S11
12. 0.54/393 Electrical Bonding and Earthing

3.1.4.3 Decommissioning of the Effluent Handling System LCP 10UH31B001

Due to the outdoor ambient and corrosive environment the Contractor is responsible for the decommissioning of the Effluent Handling System ENS-ACWS-TRO Tank Local Control Panel 10UH31B001.

- 10UH31B001 panel is energised from 50GD 380V Water Treatment Plant Board 1B (GD153).
- Circuit GD153: 380V/3PH+N fused isolator, circuit type S11 (0.63/8297).
- Power transfer from GD153 to the load (10UH31B001) is achieved through a 16mm²; armoured; 3-core, PVC sheathed cable (BVX3HCV), cable number WW 0741.

The applicable 10UH31B001 LCP Panel Drawings are provided in:

- 0.63/34515 Sheet 1/1 Effluent Handling System ENS-ACWS-TRO Tank LCP Layout
- 063/34516 Sheets 1-4 TRO Brine Tank Loop Diagram

The Contractor shall:

1. Apply for a Permit to Work (PTW).
2. Identity and disconnect all power, control and electrical bonding cables.
3. Label and mark disconnected cables as decommissioned. The cable tag numbers shall not be removed.
4. Dismantle, remove and transport the frame and panel to the Employers salvage yard.
5. The Contractor shall formally raise any plant and drawing discrepancies with the Employer for resolution.

3.1.4.4 New Temporary Sump Electrical Requirements

1. A new temporary concrete sump within the pipe trench located adjacent to the ENS shall be constructed for the effluent. The new temporary concrete sump shall be equipped with a low voltage (30kW, 380V) variable frequency drive (VFD) controlled submersible motor utilized to empty the effluent to the nearby existing brine effluent tank.
2. Due to the temporary nature of the works, on completion of the works, the Employer elects not to take over ownership of the VFD.
3. On completion of the project, in compliance to the PTW system, the Contractor decommissions and removes the VFD from site.
4. In addition to the prescripts defined in section 4.6.3 the Contractor provides the Employer with specific Engineering, Operating and Maintenance training for the VFD however the maintenance and fault-finding and spare holding activities related to the VFD remain the sole responsibility of the Contractor during the stipulated defects period
5. The power cabling systems shall be not removed, however isolated and disconnected and labelled “Decommissioned” at both ends. The cable tag numbers shall not be removed.

3.1.4.5 VFD Point of Connection

The Contractor shall reuse the previous supply utilized for the Effluent Handling System ENS-ACWS-TRO Tank LCP 10UH31B001 as the point of connection for the (VFD) circuit.

The (VFD) point of connection is as follows:

1. 50GD 380V Water Treatment Plant Board 1B
2. Circuit GD153
    - Fused Isolator Circuit Eskom type S11 (0.63/8297 sheet 4)
    - 380V AC /3PH+N
    - 100A Max Fuse rating

3. Eskom switchgear schedule 0.63/5057 Sheet 7.

3.1.4.6 VFD Location

The Contractor shall :

1. Position the (VFD) in the outside environment as close as practically possible to the new temporary sump motor.
2. The VFD shall be adequately enclosed and ingress protected (IP65) by an enclosure suitable for the harsh corrosive and outdoor ambient conditions.

3.1.4.7 LV Cabling and Cable Racking

1. All cabling, cable racks and accessories shall conform to (240-56227443) Eskom Requirements for Control and Power Cables for Power Stations Standard.
2. The existing cables and cable rack servitudes shall be reused as far as practically possible; however the Contractor remains solely responsible for the design, rating, installation and commissioning of all power cables required for the Works and VFD installation.
3. The Contractor submits all cable rating calculations in accordance with 240-56227443.
4. The Contractor shall thus:
    - Position the VFD to enable reuse of the Employers existing 16mm²;armoured;3-core,PVC sheathed cable (BVX3HCV), LV power cable number WW 0741 supplied from 50GD 380V Water Treatment Plant Board 1B, circuit GD153.
    - The WW 0741 cable was previously utilized by the decommissioned Effluent Handling System ENS-ACWS-TRO Tank LCP 10UH31B001.
    - The WW 0741 cable number shall be decommissioned and new (VSD) cable number assigned by Eskom.

3.1.4.8 Low Voltage Switchgear

1. The Contractor utilises the Employers existing switchgear, circuits and functional unit schematics for the Works.
2. The Contractor is solely responsible for the provision on of all components required for the design, modification and commissioning of the Employers existing switchgear functional units, where required.
3. The Contractor shall amend, update and submit the Employers Electrical Load List Appendix E1 240-56227927.
4. The Contractor shall ensure alignment between Appendix E1 240-56227927 and 240-61379755 Control & Instrumentation Drive & Actuator Schedule Template.

3.1.4.9 Motors

Motors shall comply with the following:

1. 240-57617975 New Low Voltage Motors Procurement Standard
2. 240-56361435 Transport of Power Station Electric Motors Standard
3. The 240-77100923 Low Voltage Motors Schedule B Appendix C2 shall be submitted prior procurement of any motors.

3.1.4.10 Variable Frequency Drives (VFD)

All Variable Frequency Drive’s (VFD’s) that form part of the project shall comply with:

1. Eskom 240-132875144 LV AC VFD Technical Schedule A&B in Appendix C2 shall be submitted by the Contractor demonstrating design specification and technical assurance.
2. SANS 61800-2 Adjustable speed electrical power drive systems Part 2: General requirements — Rating specifications for low voltage adjustable frequency A.C. power drive systems.
3. SANS 61800-3 Adjustable speed electrical power drive systems Part 3: EMC requirements and specific test methods.
4. SANS 61000-2-4 Electromagnetic compatibility (EMC) Part 2-4: Environment: Compatibility levels in industrial plants with low frequency conducted disturbances.
5. The VSD provided shall be of the free-standing type and thus not integrated within the existing LV switchgear.
6. The final optimised VFD rating, location, specialised cabling , harmonic filters or any outside field based VFD enclosures of suitable ingress protection (IP - rating) required for the installation shall be performed by the Contractor in accordance with the VFD original equipment manufacturer prescripts.

3.1.4.11 Earthing and Lightning Protection

The Contractor ensures the following:

1. All non-current carrying metal parts comprising of metal conduits, metal cable racks, cable armouring, junction boxes, panels, motor frames, switchgear enclosures and metal enclosures for motor controllers, frames, metal enclosures for various electrical equipment, electrically operated equipment, main support structures, reinforcing etc shall be electrically bonded to earth.
2. The installation shall be electrically bonded in accordance 240-56356396: Earthing and Lightning Protection Standard and associated the requirements provided in 0.54/393.
3. No additional lightning protection is required for the works.

3.1.4.12 Electrical Control and Instrumentation Interface

1. The interface between the electrical drives and outside plant room are defined by (IO block diagrams defined in the control and instrumentation section.
2. The new temporary system shall further be equipped with a new sump level transmitter. The control interface of the VFD is addressed in the control and instrumentation section.

3.1.4.13 Electrical Operating and Maintenance

The Contractor develops, provides and conducts the following:

1. Electrical alarm response procedures, operating and maintenance procedures for electrical systems provided and specifically VFD systems.

3.1.4.14 Electrical Quality Management System

1. In accordance with SANS 10142-1 prior to commissioning of the electrical systems the Contractor shall issue the Employer with an Electrical Certificate of Compliance (CoC) issued by an accredited and authorised person.
2. The Contractor shall compile and submit a technical Quality Control Plan (QCP) that is specific to Works for approval by the Employer prior to execution of the Works,
3. The Contractor’s quality control plans cover inspection and test proposals for items or activities to be supplied as part of the Works.
4. The Contractors QCP shall include :
    a) The identification of the specification, drawings or procedures for each operation.
    b) The acceptance criteria with reference to the appropriate technical specification or standard.
    c) The inspections and tests the Contractor has nominated for hold and witness points.

d) The Contractor and Employer shall allow for insertion of specific requirements, including hold, review the quality control plans and witness points, prior to commencement of work.

e) Sign of by the Contractor for Works performed prior to request for inspection and safety clearance by the Employer.

f) Inspection and test records which are generated by the *Contractor*.

g) Provision for inspections and tests nominated by the Employer.

h) Provision for inspection status indication

3.1.5 C&I Requirements

The *Contractor* shall provide a detailed design for the installation of level transmitters, pH measurement, junction boxes, splitter boxes, cabling, VFD interfacing, actuator interfacing with the existing water treatment plant Foxboro Distributed Control System (DCS).

The Contractor shall reference the following documents for additional details:

- Drive and actuator schedule
- Instrument schedule
- Limits of supply and service
- Input output block diagrams

The Contractor shall provide a design including but not limited to the following documentation:

- Hook-up drawings
- Loop drawing
- Junction box drawings
- Splitter box drawings
- Cable block diagrams
- Operating and control philosophies

The Contractor shall be responsible for the supply, delivery, installation and commission of the following

- Instrumentation as per the instrumentation schedule
- Actuators as per the drive and actuator schedule
- Three junction boxes
- Three splitter boxes
- All instrument and trunk cabling
- All terminals
- Trunking and racking
- Stands and supports
- All labelling

3.1.5.1 Variable frequency drive (VFD)

The DCS shall be configured with logic to start, stop and performs PID control within a certain range which depends on the pump characteristics, size of the tank, to prevent overflowing and cavitation of the pump as per the mechanical philosophy.
The VFD shall be interfaced to the DCS with the following signals as a minimum:

- Start command (digital input @24VDC)
- Stop command (digital input @24VDC)
- Running feedback (Potential free contact, rated @24VDC)
- VFD Ready (Potential free contact, rated @24VDC)
- Remote (Potential free contact, rated @24VDC)
- VFD speed setpoint (4-20mA input)
- Motor speed (4-20mA output)

The temporary sump instrument shall be setup and capable of going to a default minimum to stop the pump in the event of the level transmitter going into an error state.

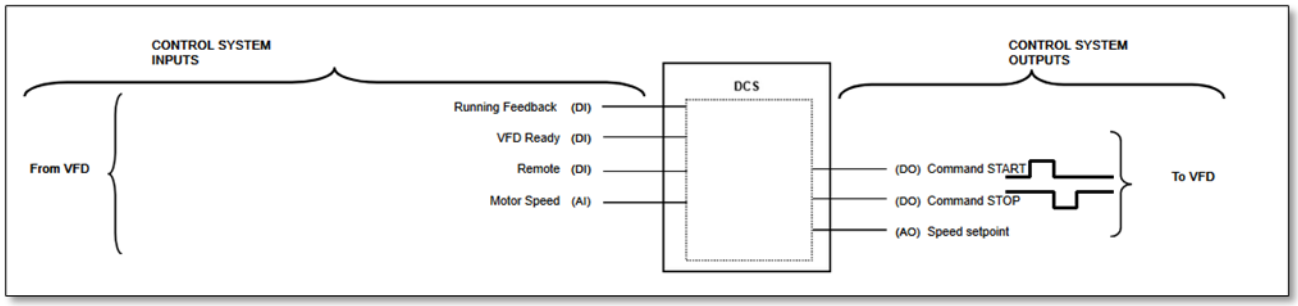


Figure 3: VFD Interface

3.1.5.2 Low Voltage Control Valves

3.1.5.2.1 Actuators

The system is currently fitted with a local control panel which controls the three actuators listed in the drive and actuator schedule. These actuators shall each be replaced with a regulating control actuator (3-phase, 380V @50Hz) that is controlled via a 4-20mA position setpoint. The control valves are electrically fed via a feeder circuit. The actuator shall have the following signals as a minimum and interfaced to the DCS:

- Position setpoint (4-20mA input)
- Position feedback (4-20mA output)
- Open limit (potential free contact)
- Close limit (potential free contact)
- Fault (potential free contact)

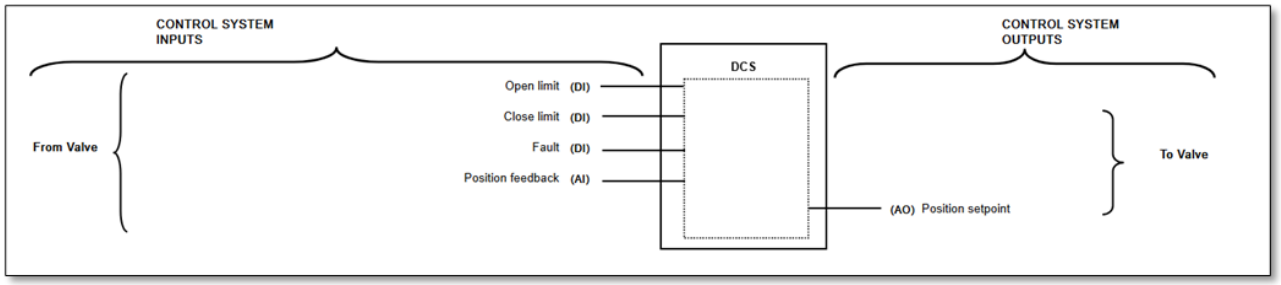


Figure 4 : Low Voltage Control Valve Interface

3.1.5.2.2 Splitter boxes

The current splitter boxes (terminal housing for signals and 380V) is not currently to standard and requires replacement. The three splitter boxes shall be replaced by appropriate splitter boxes according to the Control & Instrumentation Field Enclosures and Cable standard. The splitter box has the same requirements as the junction box. Refer to section 0 for a summary of the requirements.

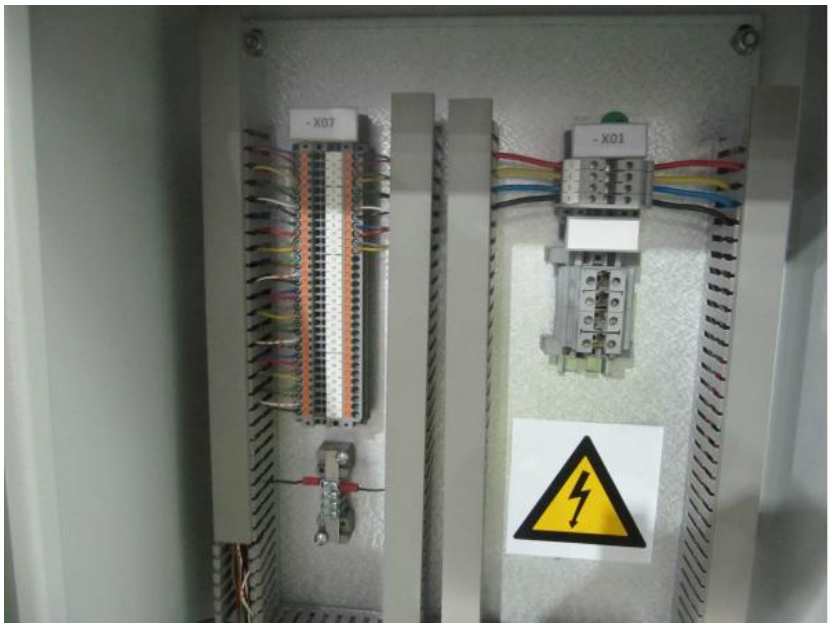


Figure 5 : Typical Internal Layout of a Splitter Box

3.1.5.3 Cabling

The instrument cabling has been damaged at several places and is currently routed to the local control panel which shall be decommissioned as part of this works. New cabling for the actuators shall be installed between:

- Splitter box and analog input junction box
- Splitter box and analog output junction box
- Splitter box and binary junction box
- Splitter box and actuator head unit

It is recommended to consider using armoured instrument cabling in this area due to regular grass cutting activities.

New cabling for the VFD shall be installed between:

- VFD and analog input junction box
- VFD and analog output junction box
- VFD and binary junction box.

New cabling for junction boxes shall be installed between:

- New analog output junction box and 10JB04 (UVG20ACM)
- New analog input junction box and 10JM02 (UVG40ACM or 2 x UVG20ACM)
- New binary junction box and 10HD09 (UVG40ACM 2 x UVG20ACM)

Instrument cabling shall comply with the Eskom Requirements for Control and Power Cables for Power Stations Standard. All cabling shall:

- Be sufficiently supported
- Does not interfere with access to the area
- Does not hinder maintenance activities
- Shall be protected from maintenance and grass cutting activities.

All remaining cabling shall be handed over to Lethabo Power Station within one week of commissioning and be delivered at a location on site as specified by the Eskom project manager.

Refer to Figure 6 for the high-level cable block diagram of the required installation

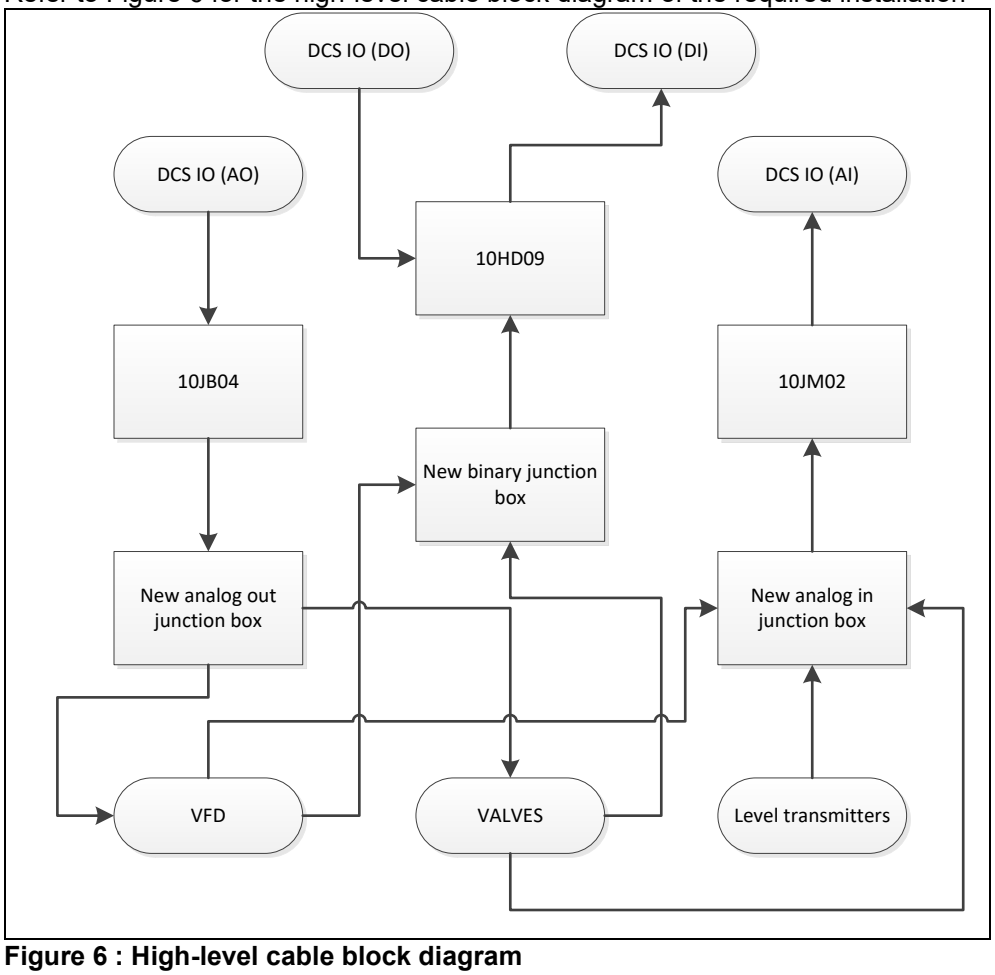


Figure 6 : High-level cable block diagram

3.1.5.4 Junction boxes

The current junction boxes in the field are corroded and damaged. Three new junction boxes shall be installed by appropriate junction boxes according to the Control & Instrumentation Field Enclosures and Cable standard. The junction boxes shall be provided with a new support stand which shall be floor mounted as per the standard and not attach to the current structures. Refer to section 0 for a summary of the requirements.

3.1.5.5 Racking, trunking and cabling pipes

The Contractor shall install new racking, trunking and piping in the area highlighted (Figure 7) in yellow for support and protection of cabling. The racking, trunking and piping shall be corrosion resistant to chemicals such as acid and caustic as the area are prone to leaks. The racking and trunking shall be installed in such a way to minimise the collection of fluids when leaks occur and preferably routed away from the pump house. The contractor is allowed to utilise existing racking outside the yellow area should there be sufficient space for the trunk cabling.
Instrument cabling shall be protected from UV as far as possible to minimise deterioration of the cable's integrity. The racking, trunking and piping shall not interfere with maintenance activities or access to the area.

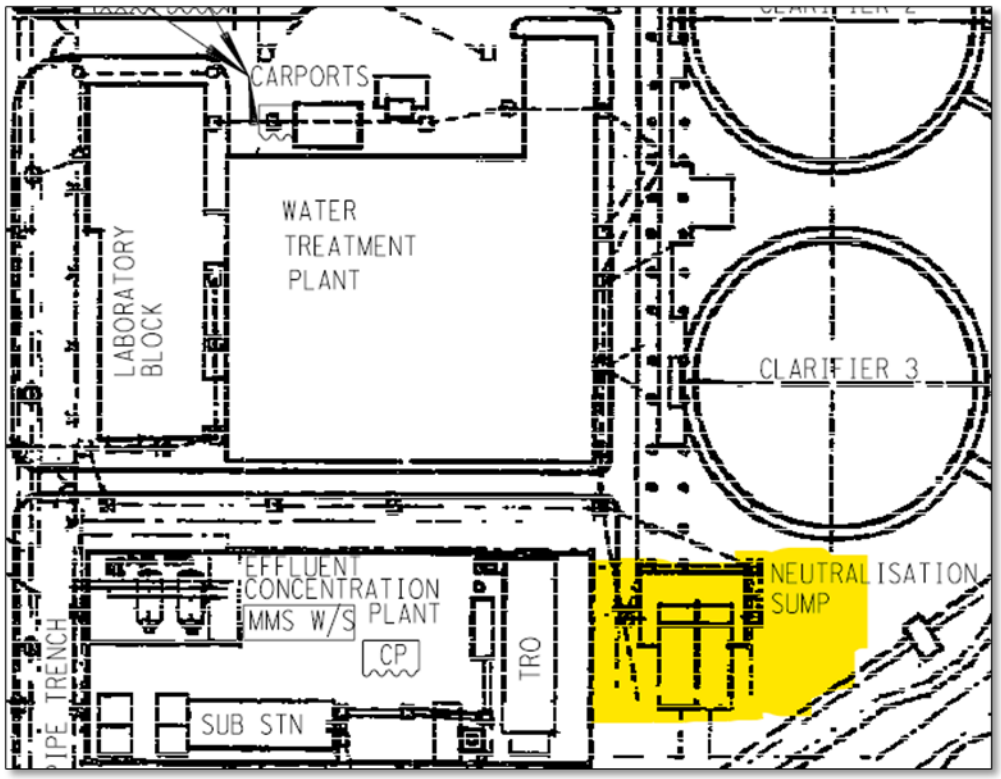


Figure 7 : ENS sump area

3.1.5.6 Field enclosure requirements

Field enclosures shall comply with the Control & Instrumentation Field Enclosures and Cable standard. The minimum requirement for the enclosure is:

- 500W x 400W x 200D
- 3CR12 or higher stainless steel
- Powder coated RAL7035
- Minimum thickness of 1.6mm
- IP66
- Enclosure shall be lockable with 6mm square key 304 stainless steel with a seal
- Hinges shall also be made of 304 stainless steel



Figure 8: Typical Junction Box

3.1.5.7 pH analyser

A new pH analyser shall be installed on the outlet of the tank and interfaced with the Foxboro DCS. The pH analyser shall be preferably be standardised with existing models used on site for standardisation purposes. The transmitter shall be installed as per OEM recommendations. The display should be preferably be oriented to the south to prevent glare and UV damage. The transmitter shall be rated for a minimum of:

- IP67
- 1-13pH range

3.1.5.8 Foxboro DCS interfaces

The instruments, actuators and drives shall be interfaced with control processor WTCP15 as it is dedicated for the effluent system. The temporary system shall utilise existing spare capacity on the Foxboro DCS.
The VFD and DCS shall be interfaced with one another via:

- W15132 for analog inputs (cubicle JM02)
- W15131 for analog outputs (cubicle JB04)
- W15126 for digital inputs (cubicle HD09)
- W15125 for digital outputs (cubicle HD09)

Refer to Appendix – Input Output Block Diagram for detailed interface requirements between the VFD and the DCS.
The low voltage control valves will utilise the same IO cards as the VFD.
Table 1 indicates the IO reserved for the project.

Table 1: Reserved DCS IO

Address	RESERVED	Project
W15125.13	Temp bypass sump VFD start command	ENS bypass project
W15125.14	Temp bypass sump VFD stop command	ENS bypass project
W15126.13	Temp sump bypass VFD running feedback	ENS bypass project
W15126.14	Temp sump bypass VFD ready	ENS bypass project
W15126.15	Temp sump bypass VFD Remote	ENS bypass project
W15126.16	RESERVED	ENS bypass project
W15126.17	10UH31S502 open limit	ENS bypass project
W15126.18	10UH31S502 close limit	ENS bypass project

W15126.19	10UH31S502 fault	ENS bypass project
W15126.20	10UH31S505 open limit	ENS bypass project
W15126.21	10UH31S505 close limit	ENS bypass project
W15126.22	10UH31S505 fault	ENS bypass project
W15126.23	10UH31S508 open limit	ENS bypass project
W15126.24	10UH31S508 close limit	ENS bypass project
W15126.25	10UH31S508 fault	ENS bypass project
W15131.5	Temp sump bypass VFD speed setpoint	ENS bypass project
W15131.6	10UH31S502 position setpoint	ENS bypass project
W15131.7	10UH31S505 position setpoint	ENS bypass project
W15131.8	10UH31S508 position setpoint	ENS bypass project
W15132.5	Temp sump bypass VFD motor speed	ENS bypass project
W15132.6	10UH31S502 position feedback	ENS bypass project
W15132.7	10UH31S505 position feedback	ENS bypass project
W15132.8	10UH31S508 position feedback	ENS bypass project

3.1.7 Mechanical Requirements

3.1.7.1 Mechanical Scope requirements

The Contractor is required to:

- Design a temporary pumping system including all the necessary pumps, valves, pipes and fittings from the temporary sump to the effluent brine tank.
- Design and modify the existing spool inlet pipe to the ENS sump to accommodate the temporary sump.
    - The pipe needs to be modified such the temporary sump can be built around the pipes without affecting the flow during the temporary sumps construction. The spool then needs to be removed once the sump is completed so that the high conductivity can be diverted to the temporary constructed sump, and also needs to be reinstated once there are any permanent/ongoing issues during testing off the temporary pumping facility.
- Design of impulse line for the pH analyser on the level probe outlet flange.
- To perform a HAZOP study.
- Supply and installation of 30kW submersible pump inside the temporary sump with all necessary brackets and fittings to ensure sound and neat installation of the pump.
- Manufacture, supply and installation of discharge piping, pipe supports and fittings from the submersible pump to the brine effluent tank.
- Supply and installation of the valves on the discharge piping which include an isolation valve and a NRV seized to the line.
- Supply and installation of the new valves for the current inlet and outlet valves for the following locations:
    - 08-10UH31S502 (80NB butterfly valves)
    - 08-10UH31S508 (300NB butterfly valves)
    - 08-10UH31S506 (250NB butterfly valves)

These valves are to be supplied with electrical actuators (as per section 4.4.4.2.1 Actuators) as a fully functional assembly by the Contractor.

Contractor to measure the face to face at Tender phase to make sure the right valves are Tendered for.

- Blanking of the overflow to the ENS sump from the ACS sump. (to be able to re-instate the overflow after the bypass system is no longer in use)
- Re-instate the overflow pipeline from the brine effluent tank to the ACS sump. The current overflow is blanked off at the bottom of the brine effluent tank.
- Manufacture and installation of impulse line for the pH analyser on the level probe outlet flange.
- Diverting the flow to the temporary by-pass sump from the following high conductivity inlets in addition to the above:
    - CIP reject to the ENS sump.
    - Chemical drains inlet to the ENS sump.
- Cold commissioning of the completed installed system.
- Hot commissioning of the completed installed system.
- Testing and of the completed installed system.
- Technical assistance with the optimisation of the plant based on the test and commissioning phase.
- The Contractor is to provide training on mechanical equipment installed with the works to the Employers staff on the operation and maintenance requirements of the individual and agreed upon components/equipment between the Contractor and Employer as well the as the completed fully tested pumping system. The Contractor should allow as a minimum x2 sessions per section (Operation & Maintenance) to allow all staff to attend training required.
    -

3.1.7.2 Mechanical Drawings requirements

The Contractor is required to supply as a minimum set of new/revised mechanical drawings:

- Revise General Arrangement Drawings – 34152_001.08 – Effluent Handling System Pipework At Water Treatment Plant General Arrangement And Details (WTP) & 34152_002.05 - Effluent Handling System Pipework At Water Treatment Plant General Arrangement And Details (WTP)
- New Isometric drawings
- Revise Piping and Instrumentation Diagrams (P&ID's) - 2635.16 - WTP (Water Treatment Plant) West High Conductivity Effluent Neutralisation System Engineering Flow Diagram
- New Pipe Support Drawings for the parts of the works the Contractor is responsible for.

The Contractor must make allowance for this, and the drawings must be supplied in a format suitable to Eskom for review and acceptance. At handover, a full set of the required drawing package is required for the entire plant the Contractor was responsible for.

3.1.7.3 Mechanical Functional and technical requirements

The Contractor to adhere to all the below standards together with additional comments specified below the standards:

- 240-123801640 - Standard for Low Pressure Pipelines
    - Pipe material to be Carbon steel rubber lined (240-101712128 - Standard for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and

Associated Piping with Linings) pipes, Contractor can cost for Stainless steel 316L as an alternative option.
    - Contractor to supply all the latest standards and specification as listed as per Appendix F1 – Piping specification (originally designed in accordance to these standards and specification listed, to be used as reference) during the design phase of the project for review.
    - Pipe to be designed for at least 10 bar pressure if not clearly stated in the document.
- 240-105020315 - Standard for Low Pressure Valves
    - Valve material to be suited for the application media.
    - Contractor to supply a valve schedule in the design report phase of the project for review.
        - Minimum requirements to be specified on the schedule are as follows:
            - Design standard for the valve
            - Design pressure rating
            - Design temperature of the valve
            - Flange drilling and pressure rating
            - Material of construction of all wetted parts of the valves
            - Face to face (in mm)
            - Material of construction of the body
- 240-56030558 – Specification for Centrifugal pumps
    - Pump not to be able to pump more than 10 bar pressure or design pressure of the pipelines.
    - Pump material of construction to be suited for the application media.
- 240-106628253 - Standard for Welding Requirements on Eskom Plant
- 240-101712128 - Standard for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings
- 240-49230111 – Hazard and Operability Analysis (HAZOP) Guideline

3.1.7.4 Mechanical battery limits:

1) Flange on the high conductivity inlet let where temporary sump starts.
2) Inlet into the effluent brine tank from the temporary sump pump.
3) Brine effluent tank outlet and inlet valves as indicated.
    - 08-10UH31S502 (80NB butterfly valves)
    - 08-10UH31S508 (300NB butterfly valves)
    - 08-10UH31S506 (250NB butterfly valves)
4) Overflow from the temporary sump to the medium conductivity sump tie-in with current piping.
5) Overflow from brine effluent tank blanked flange to the inlet of the ACS sump.
6) Level indicator flange/pipe to the inlet of the ACS sump (pH analyser impulse line for sampling)

3.1.8 Production of As-Built Information required for the Works

1. In the event that the existing baselined designs for the Auxiliary Bay area (28m level) has been altered/modified during the project, the *Contractor* is required to produce as-built drawings indicating all modifications and replacements which have occurred.

2. Refer to Section 5 for documentation and drawing requirements
3. All as-built drawings issued to the *Project Manager* will be a minimum of one (1) hard copy (A0 in size) signed by the responsible professionally registered structural engineer/technician and in electronic format. The *Contractor* submits electronic drawings in AUTOCAD or MicroStation (DGN) format and scanned drawings in pdf format. Drawings issued to the *Employer* may not be “Right Protected” or encrypted.

3.1.9 System Integration

The *Contractor* is responsible for all system interfaces which forms part of the Works. The Employer will provide the relevant information defining the system interfaces. The *Contractor* caters for all identified interfaces i.e. the *Contractor* will be responsible for providing the Terminal Points list and Interface summary.

The following technical risk assessments are carried out by the *contractor:*

a) The *Contractor* shall carry out formal Hazard and Operability (HAZOP) Studies on all systems in their design. These studies are done in accordance with the requirements as laid down in the Eskom HAZOP Guideline: (240-49230111)
b) The *Contractor* shall carry out formal Failure Mode Effects and Criticality Analysis (FMECA) studies on all systems in their supply. These studies are done in accordance with the requirements as laid down in the Eskom FMECA Guideline: (240-49230046)

3.1.9 General

a) Only equipment based on proven technology and of high reliability shall be considered for use.

b) All schedules included in the Tender Document shall be completed in full and submitted with the Tender.

c) All relevant technical information regarding each component or item offered shall be included either in the forms to be completed by the Tenderer or as an Appendix to the Tender, in order that the Engineer can make a proper evaluation of the offer.

d) Should items not be locally manufactured, Tenderers shall clearly identify these in their Tender documentation.

e) Where products of a particular supplier are specified, the supply of equal products from other suppliers may also be supplied if approval for such products is obtained from the Lethabo Responsible Engineer and design team.

f) Failure or malfunction of any component of the installation, even if attributable to the quality of supply, shall be rectified at the *Contractor*’s expense.

g) The *Contractor* determines if his equipment will fit into the spaces provided for the equipment, prior to Tendering. Any alteration required for specific equipment shall be submitted with the Tender. If no information is received with the Tender, it will be assumed that the building, space, or panel will accommodate the equipment offered.

h) In designing the works, the *Contractor* takes due cognisance of existing plant and equipment as well as safety and housekeeping constraints. It is the responsibility of the *Contractor* to overcome any issues that may arise due to space constraints with prior consent from project management and no extra payment or claim of any kind will be allowed on account of difficulties of access to the works or for the

requirements of working adjacent to or in the same area as others. Adequate working space shall be provided by the *Contractor* for all new plant and existing plant for inspection, testing, operating and maintenance purposes.

i) The *Contractor* is fully responsible for integrating his design with the existing installed plant and equipment. The works shall comply with professional engineering practice and standards for fossil fuel power plants. The works shall be designed for the environmental conditions prevailing at Lethabo Power Station Site.

j) The *Contractor* lists all the consumable components that forms part of the works, specifies each components life and includes it as part of the design package.

k) All Plant and Materials used for process control shall be constructed of suitable material so that no corrosion or erosion by chemicals can occur, by virtue of its installation in the process.

l) The *Contractor* provides all relevant welding procedures if applicable for acceptance by the Project Manager.

m) The *Contractor* will provide designs and QCP's to the *Employer* for approval prior to manufacturing.

3.2 Parts of the works which the Contractor is to design

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

3.3.1 Documentation Submission and Recording

The *Contractor* establishes a document tracking system to record the dates for the supply and receipt of all design drawings, calculations, requests for information and design documentation.

The *Contractor* submits to the Project Manager a schedule within one month of the starting date of all documents for acceptance. This schedule shall provide individual titles of drawings and calculations, and their proposed submittal dates, for submittals as requested in the Works Information and as necessary for the review by the Project Manager of the proposed means of compliance by the *Contractor* with all aspects of the requirements of the Contract. The scheduled date of first submittal, time allowed for acceptance and expected date of issue after acceptance will be shown for each drawing or document.

Works coding, labelling and description requirements are as per the AKZ requirements.

The type test certificates and reports must be for the appropriate equipment offered. The certificates and reports must be referenced to the components, combination of the components or the assemblies (for LV Switchgear).

All the *Contractor's* drawings for a switchboard have one drawing number with different sheet numbers in accordance with the proposed Drawing numbering system for switchgear. The drawing numbers are issued by the *Employer*.
During design phase, the *Contractor* submits prints of all drawings for each revision to the *Employer* for acceptance.

The *Contractor* provides full sets of drawings per circuit to the *Employer* for acceptance prior to manufacture.

All drawings provided after circuit installation are signed “As Built” by the *Contractor*. After the handover, all drawings become the property of the *Employer.*

In addition, *“*As Built” physical and functional characteristics are accurately reflected in selected documents and databases, including those for design, procurement, construction, operation, testing and training.

The configuration program will be applicable for use throughout all phases of the project life cycle, including management of spare parts, replacement parts and product upgrades, and shall form part of deliverables for hand-over to the *Employer* for use during the operation and maintenance phases of the *Works*.

The following documentation is required to be supplied for the requirements of this Works Information from the *Contractor* in the final design package before any construction commences.

1) Document submittal schedule indicating when all documents will be submitted
2) Drawing Register indicating when drawings will be submitted.
3) Complete detailed design file
4) Functional Specifications
5) Mass and Energy Balance
6) Line Sizing Calculations and Material Selection
7) Final isometric and general arrangements illustrating pipe dimensions, pipeline layouts and showing pipe supports
8) General Arrangement Drawing of System and boundaries
9) Piping and Instrument Diagrams
10) Component material datasheets
11) Quality Control Procedures
12) Inspection and Test Plan
13) Commissioning Procedures
14) Operating and Control Philosophies
15) System curves and pump curves
16) Pipeline Schedule
17) Instrument schedule
18) Drive and Actuator Schedules
19) I/O block diagrams
20) LOSS diagrams
21) Alarm list
22) Instrument datasheets
23) Instrument calibration certificates
24) Valve datasheet
25) Schematics for the electrical design
26) Critical Spares List
27) Welding Procedure Specifications
28) Welding Procedure Qualification Record
29) In situ verification certificate for all flow meters
30) Cable Schedules
31) Switchgear schedules
32) Motor datasheets
33) Termination Block Diagrams
34) Lighting Survey Report

35) Cable routing diagrams
36) Switchgear circuit schematics
37) *Contractor* to produce drawings showing all the cable routes.
38) *Contractor* to produce drawings for the distribution boards.
39) *Contractor* to produce earthing and lightning protection designs and drawings.
40) Where necessary, manufacturers shall outline drawings showing required clearance for maintenance.
41) *Contractor* to submit all equipment schedules at the end of their detailed design phase for acceptance of the *Employer*.
42) All drawings to be submitted for *Employer* acceptance before procurement, manufacture, installation, testing and commissioning of any equipment.
43) *Contractor* to produce three hard copies and one electronic copy for “As built” drawings.
44) A contractor submits an electronic copy of the contract drawings in accordance with drawing 0.00/1800, for approval at least two weeks before manufacture is due to commence.

Acceptance will be by letter listing the drawings and the allocated numbers. If a drawing is not accepted, a mark-up print showing the required revisions may be returned to the Contractor.

No drawing which has been submitted may be cancelled by the *Contractor* without prior agreement and, once issued, no alterations, additions or omission may be made to or from any drawing without re-issuing it under a new revision number.

3.3.2 Design Review

The design documentation shall be submitted to the Project Manager four weeks after the Contract Date in adherence to 240-53113685 Design Review Procedure.
Employer makes use of 240-53113685 Design Review Procedure. The *Contractor* should therefore allow for sufficient review time in the schedule by taking the mentioned procedure into account.

The *Project Manager* approves or rejects six weeks after the design is submitted.

All design work shall be signed and approved by the applicable Professional Engineer (mechanical, electronic, electrical, chemical, civil etc.) responsible for their preparation before being submitted to the Project Manager.

The *Contractor* submits detailed Technical Data Sheets of all mechanical equipment used for the works to the Project Manager as part of the design.

Approval of the design by the Project Manager does not relieve the *Contractor* of his liability for his design and drawings.

3.4 Other requirements of the *Contractor*’s design

3.4.1 HAZOP Study

The *Contractor* is required to conduct a HAZOP study with the participation of Eskom prior to commissioning of the Effluent Neutralisation Sump Temporary bypass at Lethabo Power Station. The HAZOP study shall be in accordance with Eskom procedure 240-49230111 Hazard and Operability Analysis (HAZOP) Guideline. Upon completion of the study the HAZOP report shall be issued to Eskom for review. The *Contractor* rectifies the design deficiencies as per the actions noted from the HAZOP as their cost.

3.4.2 Design Life

The design life of the works shall be until the end of station life in 2041 from commissioning of the Effluent Neutralisation Sump Temporary bypass System at Lethabo Power Station.

3.4.3 Noise Levels

The *Contractor* designs the works to conform to the following requirements with respect to noise emissions:

a) The *Contractor* guarantees the maximum sound power level (in watts) of each item of plant likely to create a noise level (sound pressure level) of 85 dB (A) according to SABS 083/1970, at a distance of 3m from any such item in its permanent location. This sound level applies to normal site operating conditions (all in situ and with the system running) with the item fitted with standard silencing equipment.

b) For this purpose, the *Contractor* acquaints himself with the particulars of the acoustic environment, e.g., size of area, type of enclosure, locality, etc. If the *Contractor* expects the noise level, as specified above, to exceed 85 dB (A), the *Contractor* shall include the required acoustic treatment (e.g. cladding, silencers, screens) necessary to reduce noise levels to below 85 dB (A) in his offer.

c) In the case of portable or moveable items of the system (e.g. compressors, travelling cranes, etc.), the sound pressure level, measured in the free field over a reflecting plant, does not exceed 85 dB (A) at a distance of 3m from the surface of the item when working at full load.

3.4.4 Plant Codification

Lethabo Power Station uses the AKZ numbering system, 15ENG MN-676-AKZ Coding Manual. A first set of P&ID's is handed to the Project Manager for coding where after the *Contractor* shall resubmit the P&IDs with the a range of AKZ codes included that can be used.

3.4.5 Specifications, Standards and Regulations

All materials and equipment shall be new unless stated otherwise. The materials should be of the standard and quality specified in the table below.
Contractor shall ensure that they are fully acquainted with the contents of the applicable specifications.
The design and manufacture of equipment and the complete installation shall be carried out and tested in accordance with the latest issue or amendments of the following Regulations, as applicable:

Employer Standards & Guidelines

Number	Title
240- 55864811	Chemistry for Coal Fired Unit with Drum Boilers Operating at 17 MPa and Above a.k.a Chemistry Standard for Coal Fired Units with Drum Boilers Operating at Greater than 16MPa
240-55864859	Mobile Sample Conditioning System and Corrosion Product Sampler for Drain Lines of LP and HP Feedwater Heaters in Power Plants Guideline
240-138867517	Corrosion Product Sampling and Analysis Guideline
240-55864893	Power Plant Chemistry Standard

240-56227443	Requirements for control and power cables for power stations
240-57617975	Procurement of Power Station LV Motors Low Voltage Electric Motors
240-56227589	List of Approved Electronic Devices to be Used on Eskom Power Stations Standard
	LV Switchgear Control Gear Assembly Associated Equipment for Voltage 1000V AC and 1500V Standard
240-56356396	Earthing and lightning Protection
240-56355754	Field Instrument Installation Standard (Rev 1)
240-55944466	Supplier Contract Quality Requirement's Specification.
240-49230111	Hazard and Operability Analysis (HAZOP) Guideline (Rev 1)
240-30008949	Safety, Health and Environmental Specifications for Contractors
240-28463367	SHE Organization
240-62196227	Life Saving Rules
240-56364537	Design of steel structures standards
240-56364545	Structural design and engineering standard
240-57127953	Execution of site preparation and Earthworks Standard
ESK SCAAC6	Specification for the Identification of Pipelines and Vessels
240-56030558	Centrifugal Pumps Specification
240-56356396 Rev 1	Environmental Conditions for Process Control Equipment Used at Power Stations Standard
240-56355754 Rev 1	Field Instrument Installation Standard
240-56355815 Rev 1	Field Instrument Installation Standard for Junction Boxes and Cable Termination Standard
240-56355843 Rev 1	Pressure Measurement Systems Installation Standard
240-56355888 Rev 1	Temperature Measurement Systems Installation Standard
240-55714363 Rev 1	Coal Fire Power Station Lighting and small power installation standard
240-56227443 Rev 1	Requirement for control and power cables for power station standard
15ENG MN-676	AKZ Coding Manual
240-71432150	Plant Labelling and Equipment Description Standard
240-53113685	Design Review Procedure
240-106628253	Standard for Welding Requirements on Eskom Plant
240-56356376	On-site Commissioning for Low Pressure Systems Standard
240-105020315	Standard for Low Pressure Valves

240-123801640	Standard for Low Pressure Pipelines
240-76992014	Project/Plant Specific Technical Documents and Records Management Work Instruction
LBT00081	Drawing Office Procedure
240-129365689	Procurement Standard of Medium Pressure and Medium Temperature Valves in Coal Fired Power Stations
240-87733094	Procurement of High Pressure Pipework
240-128557196	Procurement Standard of High Pressure and High Temperature Valves in Coal Fired Stations
240-106365693	Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings

External Standards

Number	Title
3002003500	EPRI Guidance and Design, Operation and Maintenance of steam and Water Sample Conditioning Systems (2014).
SANS 10142	The Code of Practice for the Wiring of Premises
SANS 1507	Low Voltage PVC Cables
SANS 10108 (2005)	Classification of Hazardous Location (Electrical Plant)
ISO 8573.1	Air Quality Classes
SANS 10083 (2013)	Test for Noise Levels.
QM 58	Supplier Contract Quality Requirements
SANS 10400	The application of the National Building Regulations
SANS 1200	Standardised specification for civil engineering construction
SANS 2001 Series	Construction works
SANS 10100-1	The structural use of concrete Part 1: Design
SANS 10100-2	The structural use of concrete Part 2: Materials and execution of work
SANS 10160-1	Basis of structural design and actions for buildings and industrial structures Part 1- Basis of structural design
SANS 10160-2	Basis of structural design and actions for buildings and industrial structures Part 2- Self-weight and imposed loads
SANS 10160-6	Basis of structural design and actions for buildings and industrial structures Part 6- Actions induced by cranes and machinery
SANS 10162-1	The structural use of steel Part 1: Limit-states design of hot- rolled steelwork
SANS 10162-2	The structural use of steel Part 2: Cold-formed steel structures
SANS 10144	Detailing of steel reinforcement for concrete
SANS 282	Bending dimensions and scheduling of steel reinforcement for concrete
SANS 920	Steel bars for concrete reinforcement

SANS 50025	Hot rolled products of structural steels
SANS ISO 4427	Polyethylene (PE) pipes for water supply – Specifications
SANS	Pressure Equipment Regulations, Occupational, Health and Safety Act and Regulations, 85 of 1993 HSA – applicable sections
SANS 347	Categorization and conformity assessment criteria for all pressure equipment
ISO 3834	Quality requirements for fusion welding of metallic materials

3.5 Use of *Contractor*'s design

The *Contractor* designs, procures, supplies, manufactures, delivers to site, decommissions, installs, and commissions and tests the entire *works* to ensure a fully functional system. The *works* is to be located at Lethabo Power Station, located in the Free State Province. The *Contractor* is to design the *works* to operate effectively and shall allow for continuous operation. The *Contractor* removes all plant not required as per their detail design.

The *Contractor* is to comply with the *Employer's* Design Review Procedure (240-53113685) and Project Engineering Change Management Procedure (240-53114026) in addition to the *Contractor's* own engineering governance processes. The *Contractor* completes the required design studies and documentation per phase as is covered in the Design Review Procedure (240-53113685) as a minimum. The *Employer* is to facilitate a workshop with the *Contractor* to answer questions on these procedures.

The Contractor is the Design Authority as defined in the Design Review Procedure (240-53113685). The Contractor is responsible for following this design procedure and provides all the information required for the design reviews as specified in this procedure.
All designs to be submitted for acceptance to the Employer and the Employers Inspection Authority prior to manufacture. Manufacturing and material procurement may only start after these acceptances are obtained.

The design, manufacturing, procurement, installation, commissioning and decommissioning of this system forms part of a Contractor's scope of work. The Contractor is to comply with the Eskom Design Review Procedure and Project Engineering Change Management Procedure in addition to the Contractor's own engineering governance processes. The Contractor completes the required design studies and documentation per phase as is covered in the design review procedure as a minimum.

The Contractor's design is to be submitted to the Employer for review and acceptance prior to the commencement of any work onsite. The Contactor in his submission to this tender is to include the periods for their design and internal reviews as well as Eskom's design period and acceptance.

- Individual Design Review (IDR) sessions to be held for all relevant disciplines;
- Multi-Disciplinary Design Review (MDR) session to be held between all relevant stakeholders;
- Final design (as accepted by all stakeholders) to be presented to the Central Change Control Committee (CCCC).

3.6 Design of Equipment

The *Contractor* is responsible for any designs of equipment required to execute the scope of work

3.7 Equipment required to be included in the *works*

The *Contractor* should include specialised equipment that is critical for the use or maintenance of the plant, as part of the work.

3.8 As-built drawings, operating manuals and maintenance schedules

3.8.1 Drawings

The *Contractor* is required to ensure the following:

a) Makes use of a system compatible with the *Employer*'s Microstation CAD and all drawings supplied to the *Employer* are to be provided in electronic medium (e.g. disks) in addition to prints.
b) Implements and maintains an updated drawing register, the format of which is to be accepted by the Project Manager. Updates shall be submitted on a regular basis or when significant changes are made.
c) The *Contractor* submits detailed drawings of all the separate items of the works included in the specification for acceptance once the general arrangement drawings have been accepted. If works or materials are supplied before such acceptance has been given, the *Contractor shall* modify or replaces such works or material at his own expense if called upon by the Project Manager to do so.
d) Submit four prints of all "as built" drawings with approval signatures at Completion by the ECSA registered professional engineer for each discipline as required by the design, backed up on the electronic medium, without delay on request by the Project Manager.

3.8.2 Technical, Operating and Maintenance manuals

The *Contractor* provides good quality operating and maintenance manuals prepared by suitably experienced personnel. The maintenance manuals shall state explicitly the maintenance requirements for each piece of equipment. Four copies of the first draft manuals as well as all "as built" drawings are submitted to the Project Manager for review and acceptance. Manuals shall be written in English and each manual front page should contain the Power Station's name, contract number and index. The *Contractor* also provides an electronic copy of these documents on Microsoft Word for Windows.

All manuals is required to contain, as a minimum, all aspects required for training. The manuals should indicate the level of responsibility of the operating personnel for each action in the procedures. Included in these manuals are the following:

a) Design data including descriptions of control philosophy with alarms, set-points, interlocks and logics clearly explained.
b) Process and instrumentation diagrams.
c) Range, calibration factors, calibrations certificates, data sheets, etc., for all control and instrumentation equipment.
d) Electrical diagrams.
e) General arrangement and installation drawings and instructions.
f) Operating procedures and instructions for normal and emergency conditions, including flow diagrams.
g) Maintenance procedures and instructions for specific plant and equipment.
h) All drawings required for component location, dismantling and re-assembly for maintenance.
i) Equipment details such as make, model, type, and specifications
j) Detailed parts lists and ordering instructions pertaining to storage of spare parts or to their shelf life.
k) Exploded view type drawings clearly detailing the part and uniquely identifying it, technical descriptions of the equipment and component parts.
l) Troubleshooting and fault finding guide.

m) Safety procedures and instructions.
n) All special tools and equipment required for maintaining and operating the works.

The maintenance manuals shall be separated into mechanical, electrical and C&I volumes.
The manuals shall be designed such that they can be clearly understood by technical, maintenance and operating personnel.

The technical manuals shall include fully detailed descriptions, as-built drawings, diagrams, illustrations, schedules and data for use by Eskom technical staff to evaluate performance, trace faults, adjust, maintain and fully understand the plant and plant equipment and to allow satisfactory training of junior staff in conjunction with the operating manuals.

The operating manuals shall be set out in simple terms in ordinal, tabular or pictorial form to provide factual and concise descriptions of:

I. How to carry out start-up, shut-down, and service operation of the plants by automatic, semi-automatic and by manual control.
II. What happens when the plants are operated, e.g. where does the water, chemical, air, etc. flow when a sequence is initiated or a valve is operated.
III. What an alarm condition implies and how it is corrected.
IV. What problems can occur and how they are overcome.
V. A routine visual plants inspection procedure.

The operating manuals are intended for daily use and therefore shall be separated from the technical and maintenance manuals. Bold print, diagrams, illustrations, etc. shall be used. Materials shall be suitable for heavy duty, preferably covered with protective transparent material, and be in loose leaf form to allow substitution and addition of pages.

The maintenance instruction manuals shall include schedules to cover plant inspection procedures, fully detailed maintenance programmes for plant and plant equipment services at daily, monthly, three monthly, six monthly, yearly and any other necessary intervals, and contain manufacturer’s and supplier’s detailed maintenance and lubrication instructions, diagrams, sectional drawings giving part numbers, descriptions, etc. Where spare parts have been provided theses should be coloured in, scheduled, and their filling procedure described. The manual shall also include minimum surveillance requirements for the plant.

Detailed maintenance procedures, covering removal, dismantling, replacement of parts, re-erection, checking, and reassembly and re-commissioning shall be included for all equipment. The re-commissioning shall be included for all equipment. The maintenance manual shall be fully comprehensive and cover all plants and plant equipment installed. As the manuals will be frequently used for training and maintenance, they shall be prepared similarly to those described for the operating instruction manuals for use by operating personnel.

The design of the switchgear and material selection ensures low / minimal maintenance. The intention is to enable the maintenance personnel to specialise in similar type of switchgear design and technology; hence standardisation of switchgear type and suppliers is critical. The LV switchgear currently installed is manufactured by Siemens South Africa. All hinges, locking devices, cover plates; busbar shutter mechanisms and bolts shall be positioned in a manner that will make maintenance easier.

4 Procurement

4.1 Subcontracting

4.1.1 Preferred sub*Contractor*s

The Contractor will be required to provide the Employer with all information regarding his sub-contractors. The Employer will need to approve all sub-contractors to be used by the Contractor. The Contractor shall beresponsible for all the activities performed by the sub-contractors.

4.1.2 **Subcontract** documentation**, and assessment of subcontract tenders**

The Contractor shall be responsible for all documentation and work performed by subcontractors. The Contractor shall ensure that all work performed by the sub-contractor is in accordance to the Employer's Works Information and meet all quality requirements. The Employer may make use of his quality control officers to conduct audits on work performed by the sub-contractor.

4.1.3. *Contractor*'s procurement of Plant and Materials

The Contractor shall be responsible for the storage of all equipment until delivery and installation on site. In addition the Contractor shall be responsible for transportation and offloading of the equipment onto the installation site. The Contractor is to provide a procurement plan on the programme to be submitted during tender.

4.1.4 Spares and consumables

The Contractor shall provide the Employer with a critical spares list to be kept on site for emergency use.

4.2 BBBEE and preferencing scheme

- Refer to conditions of tendering.

4.3 Accelerated Shared Growth Initiative – South Africa (ASGI-SA)

- Refer to conditions of tendering.

The *Contractor* complies with and fulfils the *Contractor's* obligations in respect of the Accelerated and Shared Growth Initiative - South Africa in accordance with and as provided for in the *Contractor*'s ASGI-SA Compliance Schedule stated below

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[Insert the agreed ASGI-SA Compliance Schedule here]

The *Contractor* shall keep accurate records and provide the *Project Manager* with reports on the *Contractor*'s actual delivery against the above stated ASGI-SA criteria. [Elaborate on access to and format of records and frequency of submission etc.]

The *Contractor*'s failure to comply with his ASGI-SA obligations constitutes substantial failure on the part of the *Contractor* to comply with his obligations under this contract.

4.4 Tests and inspections before delivery

4.4.1 Electrical Design Verification Tests

All 380V AC shall be design-verified switchgear and control gear assemblies according to 240-56227516, IEC 61439-1 and IEC 61439-2.

At tendering stage, proof for verifying the suitability of switchgear and control gear assemblies in accordance with IEC 61349 are supplied. The proof can be through:

- Test (type test certificates, type test reports (full report) for the components, combination of components and assemblies (reference design)).
- Calculation
- Verification of compliance with design rules.

In addition, the *Contractor* provides calculations (reference design) for temperature rise calculations according to IEC that were done for a previous project. The *Contractor* also provides a typical engineering design system (EDS) used for the design calculations and verifications.

4.4.2 Electrical Factory Acceptance Testing

The *Contractor* in conjunction with the *Employer's* representatives shall determine the time required by the *Employer's* representatives to perform the FAT on each board. The agreed time shall be reflected on the *Contractor's* program.

The following tests (checks) are conducted by the *Contractor* as a minimum requirement:

- Verification that the assembly is built according to the design-verification report.
- Inspection of paint
- Verification that all components are delivered to the *Contractor* premises.
- Functional combine fuse switch and motor switching device tests to check operation of auxiliary contacts relay coils, trip and close circuitry, and the indication circuitry. Checks include fuse ratings, labelling, ferrule numbers, crimping and tightness of all connections including lugs. The Supervisor witnesses these tests.
- Calibration checks of all voltmeters and ammeters to prove their operation and accuracy class.
- Checking mechanical tripping and closing devices and all mechanical interlocks.
- Verification that components installed is correct.
- Phase rotation shall be verified.
- Terminal block sizes shall be verified.
- Ringing out of circuits shall be done.

5. Construction

5.1 Temporary works, Site services & construction constraints

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

It is required, for the proper co-ordination and execution of the *Works* that the *Contractor* (if required) has an office on site for the duration of the installation and optimisation. A site will be made available to the *Contractor* for his yard within the power station security area. The yard is a raw site and will be used by the *Contractor* for the establishment of his offices, workshop and stores.

The *Contractor's* yard is subject to periodic inspection by the *Project Manager*. The location of the nearest sewer manhole, power distribution point, portable water connection storm water channel and road access point is indicated by the *Employer*. The *Contractor* is responsible for connection to the closest point of supply.

5.1.2 People restrictions on Site; hours of work, conduct and records

Normal working hours must be maintained as far as possible. The normal working hours on site will be from 07:30am to 16:30pm Monday to Friday. Should the *Contractor* wish to work outside these normal working hours, he should notify the *Project Manager* in writing.

The *Contractor* will only be allowed to work outside the specified hours once the *Project Manager* has approved the request in writing.

5.1.3 Site services and facilities

5.1.3.1 Site yard

It is required, for the proper co-ordination and execution of the *Works* that the *Contractor* (if required) has an office on site for the duration of the installation and optimisation. A site will be made available to the *Contractor* for his yard within the power station security area. The yard is a raw site and will be used by the *Contractor* for the establishment of his offices, workshop and stores.

The *Contractor's* yard is subject to periodic inspection by the *Project Manager*. The location of the nearest sewer manhole, power distribution point, portable water connection storm water channel and road access point is indicated by the *Employer*. The *Contractor* is responsible for connection to the closest point of supply.

5.1.3.2 Supply of electricity

Electricity will be made available for construction purposes free of charge from power points which will be indicated by the *Project Manager*. The *Contractor* will be responsible for the provision of the reticulation system from the point of supply. Both 220 (AC) Volt and 380 (AC) Volt are available on request. All points of supply requested by the *Contractor* are provided in terms of quantity and location at the discretion of the *Project Manager*. No guarantees of power supply quality are given and power supply breaks of some duration may occur without warning.

The *Contractor* makes arrangements at his own expense to improve continuity and quality of power where necessary for any reason and no claim of any nature relating to power failures is considered. No connection is made to the permanent installation at the Power Station without the prior acceptance of the *Project Manager*. The power supply is managed in accordance with the latest revision of the *Employer's* safety regulations, Operating Regulations for High-Voltage Systems and Plant Safety Regulations.

5.1.3.3 Lighting

Area lighting immediately outside the boiler and turbine houses and stairway lighting is provided by the *Employer*. The *Contractor* at his own expense provides temporary local lighting in accordance with the requirements of the Occupational Health and Safety Act where necessary. The *Project Manager* provides no local lighting. All construction lighting is the responsibility of the *Contractor*.

5.1.3.4 Water

Water is made available on request free of charge from water points on site. The *Contractor* supplies at his own cost all connections, fittings, piping work, temporary plumbing and pumps necessary to lead water from the *Employer's* points of supply to the various points where it is required. The *Contractor* is responsible for maintaining his equipment and to removal at Completion of the whole of the *works*.

The *Project Manager* does not guarantee continuity of supply and the *Contractor* makes his own provision for standby supplies to maintain continuity of work. Claims of any nature relating to discontinuity of water supply are not considered.

Water wastage due to un-maintained pipe work or fittings provided by the *Contractor* will be calculated and will be for the cost of the *Contractor.*

5.1.3.5 Roads and vehicles

Main access roads are surfaced and complete and may be used by the *Contractor* with the necessary care. The *Employer* maintains the Site roads, described above, to a fair condition. Any costs incurred by the *Project Manager* from damage caused to underground services, structures, etc as a result of the *Contractor* not using the prescribed routes is recovered from the *Contractor*. The *Contractor* provides temporary access points from the prescribed routes and roads to the points where the *Contractor* is required to perform work, having first obtained permission in writing from the *Project Manager.*

All vehicles used on site, by the *Contractor* will be road worthy and fitted with fire extinguishers as required.

All road signs, traffic laws and regulations on site shall be adhered to by the *Contractor*. *Contractor's* employees failing to comply with the above will be denied access onto site.

5.1.3.6 Compressed Air

The *Contractor* provides at his own cost, all connection fittings and pipe-work necessary to lead the compressed air from the point of supply to the various points where it is required. Such fittings must be compatible with the Employer's fittings so that galvanic corrosion of pipe-work is prevented. The *Contractor* is required to maintain all his connections and remove them on completion of the *works*. Compressed air wastage due to un-maintained pipe work or fittings provided by the *Contractor* will be calculated and the cost will be recovered from *Contractor*.

5.1.3.7 Ventilation

The *Contractor* is responsible for adequate ventilation of the works.

The *Contractor* shall provide everything else necessary for Providing the Works

5.2 Facilities provided by the *Contractor*

5.2.1 *Contractor's* yard, offices, workshops and stores

If it is required for the *Contractor* to have a site office for proper co-ordination and execution of the *Works,* the *Contractor* shall include in his establishment, rates for all further treatment of the yard areas that he considers necessary for his entire operation throughout his period of occupation. The *Contractor* also includes for all security fencing, security and access arrangements. Maintenance of the yard is the *Contractor's* responsibility and to the *Project Managers* acceptance.

Outfall drainage of all surface run-off drains is constructed by the *Contractor* to the acceptance of the *Project Manager* to minimise erosion and to effect control of contaminated water. The *Contractor's* plan for the layout of his yard area are accepted by the *Project Manager* prior to occupying the yard and the *Contractor* does not occupy any site area other than that allocated to him. The *Contractor's* plan states fully what measures are taken regarding removal and storage of topsoil, stabilisation of eroded areas and further loss of topsoil.

The Contractor complies with the environmental policy given in the Site regulations. The Contractor provides, erects and maintains for his own use adequate size office accommodation and stores together with such drainage, lighting, heating, and hot and cold water services as may be required. Provision is also made for adequate parking and a turning area adjacent to all the aforesaid structures. The *Supervisor* prior to commencement of any work on Site accepts all designs and layouts for these provisions.

The *Contractor* dismantles and clears the yard of all such temporary structures and associated foundations

and infrastructure at the direction of the *Supervisor* on Completion of the whole of the *works*. No such dismantling and clearance work is carried out without prior acceptance from the *Supervisor.*

5.2.2 Telecommunications

Neither a network point nor a telephone is available on site. Should the *Contractor* require one, he is to make his own arrangements with relevant authorities. Should the *Contractor* wish to use radio communication equipment on site, he will make his own arrangements with the relevant authorities. In this case, he is requested to liaise with the head of security at the station to ensure that there is no interference with existing channels or equipment.

5.2.3 Sanitary facilities and refuse

The *Contractor* is to supply and maintain his own sanitary facilities at his *Contractor's* yard. A refuge control system will be established by the *Contractor*. All waste and refuge is collected and disposed of as directed by the *Project Manager.*

5.2.4 Equipment and appliances

Any electrical Equipment, or appliances, used by the *Contractor* conforms to the applicable Occupational Health and Safety Act and safety standards. The *Contractor* shall maintain his equipment and appliances in a safe and proper working condition. The *Project Manager* has the right to stop the *Contractor's* use of any electrical Equipment, or appliance, which, in the opinion of *Project Manager*, does not conform to the foregoing.

Any special tools and equipment to be used on site for the execution of the *works* is the responsibility of the *Contractor*. No extension of time and/or claim for standing time will be granted should the *Contractor* not conform to this specification.

5.2.5 Access to site

The *Contractor* makes his own assessment of, and allows in his rates for those access problems that may be encountered. No extra payment or claim of any kind is allowed on account of difficulties of access to the *works* or for the requirement of working adjacent to or in the same area as the *Employer*.

5.2.6 Laydown

No Plant and Material lay down areas are permitted on site. The *Contractor* delivers all Plant and Materials to the point of erection as and when needed. Plant and Materials not used within 14 days are removed from the terrace and stored in the site yard.

5.2.7 Site regulations

The *Contractor* complies with the Site Regulations, a copy of which is available at the *Project Manager's* offices. Any subject within the authority of the *Project Manager* may be addressed by a Site Regulation. Before work starts on Site, a kick-off meeting is held with the *Contractor* and the *Project Manager*, to explain in detail all requirements of the Site Regulations.

The *Contractor* is issued with a file of current Site Regulations at the project kick-off meeting. The file remains the property of the *Project Manager* and the *Contractor* is responsible for its maintenance and updating to include new or revised regulations as issued by the *Project Manager* during the course of the *works*.

5.2.8 Permit to Work (PTW) system

No work shall be carried out without a "Permit to Work"

The *Contractor* complies with the *Employer's* Plant Safety Regulations and Operating Regulations for High Voltage Systems. The *Contractor* ensures that all Supervisors attend *Employer's* Plant Safety Regulations and Operating Regulations for High Voltage Systems training. The *Contractor* must ensure that as a minimum two *Supervisors* are authorised as Authorised Supervisors before works can commence.

5.2.9 Accommodation and transportation

The *Contractor* provides his own accommodation, meals and transport for all his employees engaged in the execution of the works. This includes the needs of his Sub-Contractors. The cost for accommodation, meals as well as for transportation to and from Site is included in the Prices. The *Contractor*'s employees are not allowed to sleep on site.

5.2.10 *Contractor's* organisation

The *Contractor* submits a project organogram to the *Project Manager*.

5.2.11 Security

The *Contractor* provides security necessary for the protection of the *Works* at all times until the Completion of the whole of the *Works*. Access to the site is controlled and it is governed by the terms and conditions laid down by the Station Security Officials from time to time. The proposed site will be shown to the *Contractor* during site meeting or clarification meeting. The *Contractor* liaises via the *Project Manager* with the Power station Security staff in order to obtain temporary permits for his staff and vehicles which will be working within the station.

The *Contractor* submits his application for vehicle permit to the *Project Manager*. Personnel and vehicles entering and leaving the site are subject to routine searches. The *Contractor* must obtain a "Gate Permit" from the *Project Manager*, before materials and equipment can be removed from the site. The "Gate Permit" gives an itemised list of materials and equipment to be removed from site. If any *Contractor's* staff are transferred from Lethabo or leave Site, the person's permit is handed over to the *Supervisor*. The *Contractor* ensures that personnel leaving site are transported out of the security area and that the permit is returned.

No firearms, weapons, alcohol, illegal substances and cameras (including cell phones with cameras) are permitted on Site. No 'Private Work' is carried out for or on behalf of any *Employer's* employee. Any person suspected of being under the influence of alcohol is tested and if proved positive, is refused entry to the security area.

5.3 Completion, testing, commissioning and correction of Defects

5.3.1 Use of the *works* before Completion has been certified

N/A

5.3.2 Materials facilities and samples for tests and inspections

In the case where the *Contractor* can guarantee the *Employer* that no additional test will be required to test the performance of the Effluent Neutralisation Sump Temporary bypass system before commissioning, no additional tests will be required. If the above mentioned guarantee cannot be met the *Contractor* will have to perform any required additional test on the Effluent Neutralisation Sump Temporary bypass system and it must be witnessed and accepted by the *Employer*.

5.3.3 Commissioning

Commissioning is defined as bringing into service all items and meeting the functional requirements and performance criteria for the Works. The Contractor is responsible for co-ordinating and executing commissioning (including that of sub-contractors) activities in conjunction with the various departments of the Employer namely Operations, Engineering, Commissioning and QA/QC. Commissioning includes testing and verification of the stated performance criteria with:
Minimum Testing and Assessment criteria (as set-out in previous sections of this Works Information document as well as supplementary requirements which will be discussed with the detailed QA/QC plan).
Commissioning of the Works will commence after the plant safety clearance (which includes all turnover packages from construction to commissioning and including submissions such as the Contractor's Mechanical Completion Certificate to the Employer).
The Contractor submits a recommended Commissioning and Testing Program to the Employer for consideration and acceptance. The accepted schedule forms the basis of the commissioning and testing program that is implemented during the overall unit commissioning and testing program. Prior to the time when commissioning is to commence, the Project Manager appoints a representative who will co-ordinate the commissioning of all Plant and Equipment forming an integral part of the system being commissioned.

Any commissioning and testing activity is confirmed on the project schedule with the Employer and if necessary, rescheduled (and where requested, in writing) by the Contractor in the appropriate forum provided 48 hours in advance to allow for the release of the plant for operation.
The Contractor interfaces directly with the station's commissioning staff and other involved Contractors and is available on a 24-hour basis on site if required for specific activities until this phase is completed.
The *Contractor*, at the time of commissioning, shall have the agreement, or alternatively, the attendance of the Project Manager involved in a particular phase, before proceeding with commissioning. Consequently, the *Contractor* assures himself as to the safety of his own Plant and Equipment in respect of any particular commissioning test and in the event of damage accepts responsibility for such Plant and Equipment. In the event of incorrect functioning, the *Contractor* determines the cause and he corrects the defect. The *Contractor*'s preliminary trials and commissioning of the plants shall be carried out by the *Contractor*'s representatives, who shall remain in attendance until such time as the plants are working to the *Employer*'s satisfaction.

The *Contractor* provides a commissioning plan highlighting the requirements for commissioning (i.e. potable, demineralised water, air requirements, etc.) and the duration of commissioning. The plan shall also indicate how commissioning wastewater (if any) will be dealt with.

The Contractor prepares and submits, two months before the installation phase commences, for approval to the Employer, Commissioning and Testing Procedures for all the commissioning and testing activities to be performed, detailing the methods, functionality checks, and acceptance criteria that are applicable.
Visually inspect the Works and components to verify the placing of plant labels, for their correctness and completion as per the requirements as set out in Section 16 of this Works Information, it should also be on the ITP/QCP and data book documentation.
The *Contractor* will provide sufficient skilled personnel for the satisfactory and timely commissioning of equipment; including the re-commissioning of existing equipment that will form part of the Works. The Contractor also provides all the test equipment for commissioning of the Works.
The *Contractor* must certify, in writing and in an official format (Certificate of Manufacture), to the Employer that equipment is in a suitable and safe condition for use before it is placed in service. The *Contractor* submits to the *Employer* on the ITP/QCP and documented in the data book for approval and endorsement of the following documents:
• All commissioning check sheets and tests (hot and cold commissioning)
• Operational Acceptance Test reports
• Permits and Safety

The procedures shall include, but not be limited to, the following activities:
• System completeness checks

• Instruments calibrations
• Loop checks
• Pre-energisation checks
• System internal cleaning
• System set up
• System function checks
• Hot commissioning including system check procedures
• All commissioning check sheets and tests
• Operational Acceptance Test reports
• Permits and Safety

The *Contractor* prepares commissioning procedures and testing certificates for the commissioning of the Effluent Neutralisation Sump Temporary bypass system for the *Employer's* acceptance and it should also be recorded on the ITP/QCP and documented in the data book. The *Employer* takes over sections of the system as required once the system performance requirements have been verified by the *Contractor and the system has been accepted*.

The operating manuals should be submitted at least 4 weeks prior to the start of commissioning for acceptance by the *Employer*.

Records and reports of all tests and inspections are prepared and submitted to the *Employer*.

5.3.4 Contract Spares

The *Contractor* supplies, on acceptance by the Project Manager, a set of spares considered to be essential and as part of the works.

The *Contractor* submits, on completion of the design, a detailed listing of the recommended spares and prices for the Project Manager's acceptance to comply with the aforementioned requirement. The prices quoted shall include for packing, delivery to and off-loading at site, inspection and testing and adequate protection against corrosion, damage and weathering during transit and storage.

5.3.5 Commissioning spares and special tools

All special tools required for maintenance, equipment calibration and repair of the works as well as the necessary commissioning spares is provided by the *Contractor* during the commissioning period, and through to the Defects Date. These become the property of the *Employer* thereafter and are handed over by the *Contractor* on the Defects Date.

The *Contractor* submits, on completion of the design, a detailed listing of such tools to the Project Manager.

5.3.6 Defects / Proving Period

After completion of the *Contractor*'s preliminary trials and commissioning of the plant to the *Employer*'s satisfaction, the plants will be taken over by the *Employer* and continue in normal service for a minimum period of 12 months.

During this proving period the *Contractor* optimises all aspects of the operation of the plant and is responsible for any defect resulting from faulty design, material and workmanship. The *Contractor* remedies such defects at his own expense and as soon as possible when called upon to do so by the *Employer*.

Any outage of sections of the plant required by the *Contractor* during this period shall, as far as practicable, be arranged to suit the convenience of the *Employer*. The duration of the outage shall be supplied to the *Employer* in advance (at least 1 week) so that necessary arrangements can be made.

Acceptance tests to determine the efficiency, performance and other guarantees specified will be carried out at any time during the six months proving period by mutual agreement between the *Employer* and the *Contractor*.

5.3.7 Acceptance Tests

The *Contractor* guarantees and demonstrates, through specified acceptance tests the operational performance of the works.

The *Contractor* is required to indicate the full extent of the guarantees they are prepared to offer with respect to mass flow, ensuring electrical and instrumentation equipment is fully functional with the existing plant, efficiency and availability. The guarantees encompass the structural integrity of all components of the design and compatibility of all materials used to interface with existing plant.

Acceptance tests are carried out to prove all the plant guarantee figures provided by the *Contractor* in the technical schedules.

For the acceptance tests the *Contractor* is required to include:

- Four copies of the test programme and test sheets
- The services of a skilled testing Engineer that is fully experienced in the type of plant installed to be present in carrying-out of the acceptance tests throughout their duration.
- The provision of suitable testing equipment designed to impose simulated varying operating conditions on the plant. The design and use of such testing equipment shall be subject to the approval of the *Employer*.

The acceptance test compromises of 3 tests of 72 hours running time each, per unit. If, at any time during the test, modifications or interventions are required, the test will be deemed unsuccessful.

Where the results of the performance tests performed do not correlate with expected results (concentration values, flow rates, pressures etc.) and/or the control functions as per the operating philosophy do not meet the specifications guaranteed, the *Contractor*, at his own expense, carries out all necessary adjustments and modifications to the works required to obtain the stated tolerances. Fully detailed proposals are submitted in writing to the Project Manager for approval before any adjustments and modifications are made and work in this respect is carried out when convenient to the Project Manager and does not interfere with the operational requirements of the WTP. All adjustments and modifications are subject to inspection and approval by the Project Manager.

When adjustments and modifications are completed, the *Contractor* advises the Project Manager in writing to this effect and applies for a further acceptance test. From the results obtained, and provided that the *Employer* is satisfied that it will be lasting, the works will be finally accepted by the *Employer*.

5.3.8 Start-up procedures required to put the *works* into operation

The *Contractor* will work with the Appointed Operator of the plant to put the Works into operation after it has been safety cleared.

5.3.9 Take over procedures

The *Employer* will take over the plant after he is satisfied with the optimisation. The *Contractor* will need to be on standby for the first 2 days after hand over and must provide further telecommunication assistance for the whole testing duration. The *Contractor* must be available on site within 24 hours to provide technical assistance if required during the testing period of 3 months.

5.3.10 Access given by the *Employer* for correction of Defects

After the works have been put into operation, the *Contractor* will be required to follow the Plant Safety Regulation to work on the Works. He shall not work without a Work Permit to gain access to the plant.

5.3.11 Training and technology transfer

The *Contractor* provides training for the *Employer*'s personnel, as specified in section 2.11.

6 Plant and Materials standards and workmanship

The following applies for the manufacturing of the Plant and Materials:

- The *Contractor* manufactures, fabricates and assembles the Plant and Materials in accordance with the *Employer*'s standards and specifications as listed in Section 3.4.5 below.
- The *Contractor* tests and commissions all the shop fabricated Plant and Materials required for the completion of the works. The Project Manager approves the *Contractor*'s off Site testing plan. The Project Manager decides which tests are witnessed by a representative of the *Employer* and communicates it to the *Contractor*.
- The Project Manager reserves the right to request the manufacturer's detail drawings relating to the proposed materials, heat treatment, machining and surface roughness tolerances in order to perform a design check.

6.1.1 Tests and Inspections before delivery

The *Employer* carries out quality inspections at his discretion.
All inspections and testing to be performed in accordance with the Quality Control Procedure (QCP) developed by the *Contractor,* approved by the *Employer* prior to manufacturing.

The *Employer* is provided access to the *Contractor's* premises for the purpose of:
a) Establishing compliance with the contractual requirements by means of inspections, surveillance and audits.
b) Witnessing the performance of any tests.
The *Employer* inspects switchboards or panels forming part of the Plant before they are released from the *Contractor's* premises at his discretion. This inspection entails a thorough check to ensure complete compliance with this specification including schedules, design drawings and other applicable standards.

The *Contractor* shall obtain clearance from the *Employer* or the *Employer's* agent before despatching of the equipment. This factory release inspection does not release the *Contractor* of any of his obligations under the contract.

No Plant will be released for dispatch without the AS MANUFACTURED documentation and drawings accompanying them.

6.1.2 Factory acceptance and testing (FAT)

The *Employer* inspects and tests some parts of the Plant at the manufacturer's premises before dispatch, where required. The *Contractor* advises on a period required for the inspection and testing activities of part of the Plant. The *Employer* will then advice on the parts of Plant he needs to inspect and/or test and the *Contractor* makes allowance in the delivery time to cater for this requirement.

The *Contractor* supplies a detailed procedure that is used for Factory Acceptance Testing (FAT) to be accepted by the *Employer*, 30 calendar days prior to starting date of the first FAT. The *Contractor* gives the *Employer* at least 14 calendar days' notice of the date on which any panel is ready for inspection and testing.

The following tests and checks are conducted by the *Contractor* as a minimum:

a) Visual inspections to verify the mechanical and/or physical integrity of the Plant as well as specifications of the major and/or active components.
b) Manual electrical operation test of the circuit breakers and motor switching devices including checks of electrical interlocks (if applicable). The test is conducted at the maximum, nominal and minimum voltages.
   Material testing to adhere to mechanical requirements and HP pipework and procurement standards

6.1.3 Inspection and Testing of the works on site

6.1.3.1 Tests on Site

Tests are carried out to ensure the correct function of the equipment, safety of works and personnel, and to determine compliance with specifications before being taken over. The *Contractor* supplies a schedule and program of all tests that are to be carried out and indicates the details of tests he proposes to perform and the manner in which the results of tests will be documented.

The *Contractor* provides calibration certificates for all test equipment used when required to do so by the Project Manager.

The *Contractor* to perform NDT on all welds as per the Eskom Welding Rulebook and SANS 3834-2

For HDPE piping the following test shall be required:
NDT on all fusion welds
Pressure test to be carried out as indicated in ISO 4427.
Where required (on HP/HT components), AIA should be involved in testing

6.1.3.2 Test certificates

The *Contractor* provides a test certificate for each test as mentioned above to the Project Manager for acceptance. The *Contractor* indicates the details of tests he proposes to perform and the manner in which the results of tests will be documented. Specimen tests used by the *Contractor* are required to be submitted.

6.2.1 Investigation, survey and Site clearance

Survey of proposed location

1. The *Contractor* is responsible for the complete surveying and setting out of the *works* including establishment of any benchmarks required to complete the *works*.

2. The *Contractor* confirms the available space in the proposed area for the design of the proposed facilities taking note of all existing services, structures and any obstructions to the *works*.
3. The *Contractor* is required to consult the Surveyor-General's office to obtain information on available registered beacons near Lethabo Power Station to use for the establishment of any required benchmarks close to the *works*.
4. The *Contractor* ensures that the site where the *works* is to be conducted is cordoned off to ensure safe working conditions during the project execution.
5. The Contractor ensures a clear working space is accessible at all times by removing all debris and unused materials/equipment.

6.3 Building works

A detailed account of the building works that is to be conducted during this project is contained in section 6.4 below.

6.4 Civil engineering and structural works

6.4.1 General

1. The *Contractor* is required to confirm all site dimensions, levels and cast-in items positions on site prior to any fabrication of steel or casting of concrete.
2. The *Contractor* is required to submit a comprehensive method statement of the *works* to the *Project Manager* for acceptance prior to the start of the *works*
3. The *Contractor* is responsible for the design, erection, maintenance and removal of all temporary bracing or propping required for the execution of the *works.*

6.4.2 Reinforced Concrete

1. All concrete work is required to be in accordance with SANS 2001-CC1 and SANS 10100-2 unless otherwise stated.
2. All concrete surfaces and cast-in items is required to be inspected and accepted by the *Project Manager* in writing before casting of concrete may commence.
3. The *Contractor* is required to obtain written acceptance from the *Project Manager* for the use of any add-mixture or the use off ready mixed concrete, to pump concrete, or to use cement or cement blends other than ordinary Portland cement (OPC)
4. Compaction of concrete is required to be done by means of mechanical vibrators only.
5. The *Contractor* is required to submit the concrete mix design to the *Project Manager* for acceptance.
6. The *Contractor* is required to demonstrate, by means of a report from an approved laboratory, that the aggregates do not exhibit excessive shrinking properties in accordance with SANS 1083 and is also required to demonstrate that the aggregates do not have a potential alkali silica reaction.
7. All concrete is required to have a maximum water/cement ratio of 0.45 with a minimum cement content of 420 kg/m^3
8. The *Contractor* is required to perform a slump test on the same batch of concrete every time a sample is taken and the result recorded.

Table 9 below indicates particular specifications pertaining to SANS 2001-CC1 and must be read in conjunction with the code.

Table 2: Specifications pertaining to SANS 2001-CC1

Clause	Particular Specification

Clause	Particular Specification
4.2	**Materials**
4.2.3.5	The following tests are required: • drying shrinkage on fine and course aggregates; • drying shrinkage of concrete; • flakiness index of the stone; • alkali-aggregate reaction.
4.2.7	In general, one of the following types of non-shrink grout are required to be used: • Cement-based non-shrink grout, not less than 50 MPa; • Special proprietary non-shrink or expansive grout, not less than 50 MPa.
4.2.6	Concrete Grade is required to be: • Class 15 MPa/ 19 mm for Blinding Concrete (28 days), • Class 35 MPa/ 19 mm for Structural Concrete (28 days).
4.3	**Formwork**
4.3.1.8	Tolerances on all concrete work is required to be a level II degree of accuracy as specified in SANS 2001-CC1 with and is to be carefully maintained throughout the construction.
4.4	**Reinforcement**
4.4	All reinforcement is stamped with a SANS quality assurance mark.
4.4.3.1	Cast in-situ concrete cover is required to be a minimum of: • 60 mm for exposed to earth or water; • 40 mm for above ground or not in contact with soil.
4.7	**Quality of Concrete**
4.7.1.1	*Contractor* submits to the *Supervisor* full details and samples of all materials which he proposes to use for making concrete at least 28 days before the concreting of the works is due to commence.
4.7.10	• A layer of blinding concrete of 50 mm minimum thickness is required to be placed under foundations. • A polyethylene sheet with a minimum thickness of 250 microns is required under ground slabs
4.7.12.2.3	• All angled corners are chamfered 20 mm x 20 mm, unless such other larger size is detailed on the Drawings.
4.7.19.3	• *Contractor* submits a detailed procedure for acceptance by the *Supervisor* on how he intends to carry out the repairs of structural concrete defects
4.7.22	• For concrete pour records, the *Contractor* submits a detailed Quality Control Plan to the *Supervisor* for acceptance. • In addition the *Contractor* supplies the *Supervisor* with two copies of these records each day covering works carried out the preceding day.
5.1	**Testing**

Clause	Particular Specification
5.1.1.4	• Eight 150 mm cube samples taken from each batch or place of concrete deposition, four cubes are tested at 7 days and four at 28 days. • Strength at 7 days is required to be at least two thirds of 28 day strength.
5.1.2.1	• Any of the cube samples tested indicating a result more than 3 MPa below the specified strength is disregarded.
5.1.3.3	Add the following: • …, unless no more than three batches of concrete is being mixed.
5.2	**Tolerances**
5.2.1.1	Tolerances on all concrete work is required to be a level II degree of accuracy as specified in SANS 2001-CC1 with and is to be carefully maintained throughout the construction.
5.2.2.1 Table 11	Add the following under “Location of holding-down bolts”: 3) The permissible deviation between any two bolts that share the same base-plate is limited to 2mm for bolt sizes up to and including M24, and 3mm for bolts larger than M24.

6.4.3 Structural Steelwork

1. All work is required to be in accordance with the latest edition of SANS 2001-CS1
2. The *Contractor* is responsible for the stability of the entire structure and all structural elements during all the erection stages.
3. All dimensions are required to be verified on site by the *Contractor* before any fabrication of steelwork commences.
4. All welding is required to be conducted by coded welders. Supporting documentation is also required to be submitted to the *Project Manager* for acceptance. All welding is required to comply with AWS D1.1.
5. All welds are required to be inspected using visual aids
6. The *Contractor* is required to supply all bolts, washers, nuts etc. for the structural steelwork.

The table below indicates particular specifications pertaining to SANS 2001-CS1 and must be read in conjunction with the code.

Table 3: Specifications pertaining to SANS 2001-CS1

Clause	Particular Specification
4.1	**Materials**
4.1.1	Add the following: All structural steelwork is required to be grade S355JR
4.1.4.1	Electrodes for electric welding are required to be E7018.
4.1.5.1	Bolt grade 8.8 is required as a minimum

Clause	Particular Specification
4.6	**Workmanship - Erection**
4.6.5	On site welding is not permitted
5.3	**Non-destructive testing of welds**
5.3.3	• Fillet welds are required to undergo magnetic particle inspection (20 % of welds)
5.3.4	• All butt welds and full penetration welds are required to undergo ultrasonic non-destructive testing (100 % of welds)

6.4.4 Corrosion protection

1. Corrosion protection is required for all steelwork in accordance with GSP 36-1126 – Specification for Corrosion Protection of Plant and Equipment with Coatings.

6.4.5 Construction

6.4.5.1 General

The *Contractor*:

1. Adheres to the South African Environment Protection Act, the waste management code of practice and the South African Occupational Health and Safety Act No. 85 of 1993, the regulations promulgated thereunder and Eskom Safety, Health, Environment and Quality (SHEQ) Policy 32-727 for all *works*.
2. Submits a comprehensive method statement of the entire *works* to the *Project Manager* for acceptance prior to the start of the *works*
3. Submits a project specific safety file to the *Employer* for comments / acceptance.
4. Submits a detailed level 3 schedule for the *works* to the *Project Manager* for acceptance after contract award.
5. Takes all necessary precautions to ensure that none of the existing structures / facilities not forming part of the *works* is damaged during construction.
6. Prepares earthworks to create access to the working areas. The *Contractor* disposes of all rubble at a waste disposal site to be approved by the *Employer*. The waste disposal site is selected to suit the classification of the materials to be disposed of. Certificates of disposal are required to be submitted to the *Employer*.
7. Stores salvaged plant/materials/components elevated off the ground to protect from ingress of dust and rainwater, etc.
8. Continuously a monitor the condition within the working and surrounding areas for any hazardous substances or situations, and in such case, the Contractor is required to take necessary precautionary measures.
9. Manages his access to the working areas and the Site.
10. Manages his activities on Site to ensure that no interference takes place between his work and that of others.
11. Completes "Contract Activities Daily Reports".
12. Liaises with the *Supervisor* regarding utilities and telephone facilities required for his Site establishment.
13. Liaises with the *Supervisor* regarding the location of waste disposal sites and rubbish dumps.

6.4.5.2 Construction and Erection

1. The *Contractor* is responsible for the construction of the facility and all associated services in accordance with the accepted detailed drawings and specifications.
2. The *Contractor* disposes of all construction waste at a licenced waste disposal site to be accepted by the *Project Manager*. The waste disposal site is selected to suit the classification of the materials to be disposed of. Certificates of disposal are required to be submitted to the *Employer*.

6.4.6 Quality Management

1. The *Contractor* submits a fully detailed Quality Control Plan (QCP) for acceptance within one week of the Contract Date.
2. The *Contractor* submits a schedule of unpriced orders to be placed and this is updated regularly.
3. The *Contractor* is responsible for defining the level of QA/QC (intervention Points) or inspection to be imposed on his *Subcontractors* and suppliers of material in the Quality Control Plans (QCPs). This level is based on the criticality of plant and materials, and is submitted to the *Employer* for acceptance.
4. Product data sheets and product samples are submitted for review and acceptance by the *Project Manager* after contract award and prior to the commencement of work.
5. The *Contractor* submits on a monthly basis, the following QA returns:

- A register of Defects with those older than 30 days being flagged and an explanation attached
- Register of accepted Defects
- A register of Non Conformance Report
- Monthly Project Quality Report
- Monthly updated Site and pre-site programmes
- Inspection dates
- Site Acceptance Tests
- Inspections completed / outstanding

6. All quality control documentation is submitted to the *Project Manager* within 7 days of Contract Date.

6.4.7 Handover

1. Apart from any statutory data packages required, the *Contractor* also compiles a data package of the relevant drawings, test certificates etc. to the *Project Manager* for acceptance. These include, but are not limited to:

- Concrete 7 day and 28 day cube test results
- Slump test results
- Concrete mix designs including all required test results e.g. aggregate test results
- Welding procedure specifications
- Welder qualifications
- Non-destructive weld test results
- Weld test certificates
- Steel grade certificates

- Bolt grade certificates
- Pre-concrete and post concrete surveys
- As-built data and drawings of the completed *works* upon handover. As-built drawings are submitted in PDF and native CAD formats
- Structural Certificate signed by the *Contractor's* Professional Civil Engineer confirming that all structures have been constructed in accordance with the design

6.5 Electrical & Mechanical engineering works

6.5.1 Mechanical

6.5.1.1 Mechanical Specifications

The following equipment specifications shall be adhered to:

6.5.1.1.1 Pumps

The *Contractors* will comply with Eskom Specification 240-56030558 Centrifugal Pumps.

6.5.1.1.2 Pipework

1. All the pipework supplied in one contract and complying with this specification shall be designed, manufactured, fabricated, erected and tested to comply with the contractually defined latest edition of a single national or international code and its associated standards. Mixing of codes from different countries of origin is not acceptable.
2. The pipeline shall conform to environmental regulation. Pipes are to follow best practices and shall adopt the same Pipework Standard/Code currently at the facility. Proposed design Code is EN 13480
3. Pipes are required to be sloped and include drain valves to cater for drainage during maintenance, and includes isolation valves.
4. The pipes are required to include all fittings (bends, expansion joints, etc.) and supports where needed.
5. Pipe supports are to be according manufacturer specifications when the pipe is above ground.
6. Pipe sizes are to be selected so that the following maximum permitted velocities or pressure differentials are not exceeded by design, or maximum upset conditions.
7. The Contractor submits the pipe data sheets and complete design to Eskom for acceptance.
8. The Contractor's design verifies and ensures the integrity of all pipe work. The materials of construction for the pipework is suitable for the water and environment it is in contact with.
9. The contractor performs corrosion protection in accordance to 240-101712128: Standard for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings.
10. All pipes are painted at minimum in accordance to SANS 10140: Identification Colour Marking.
11. The Contractor ensures that the Hydrostatic strength test procedures and constraints adhere to that specified in SANS ISO 4427.
12. Data books, to include all necessary material and test certificates maintained as part of the QA documentation and made available for inspection if so requested by Employer.

6.5.1.1.3 Butterfly Valves

6.5.1.1.3.1 General Specification

Butterfly valves should conform to either BS EN 593 Industrial valves – Metallic Butterfly valves, BS ISO 10631 Metallic Butterfly valves for general purposes or SANS 1849 Butterfly valves for general purposes.
The service applications of butterfly valves are one or a combination of the following: tight shut-off, low leakage or regulating of a fluid or gas within a pipeline.

Small butterfly valves shall where possible be installed with the disc shafts horizontally or vertically. Any deviation shall be communicated to Eskom for approval.

6.5.1.1.3.2 Components Specification (Small bore < 600mm)

6.5.1.1.3.2.1 Body

- Body shall be from one continuous casting without any seams or joints. Body style can be double flanged, wafer or lugged design.
- Cast iron / ductile iron Body pressure class will be 1.6MPa. Valves with a pressure rating of 2000 kPa are acceptable for lower pressure applications.
- Carbon steel bodied will comply with ANSI class 150.
- The body will have an integral flange for mounting to an ISO 5211 Industrial Valves – Part turn actuator attachments mounting platform.
- Valve body shall be designed in accordance to the requirements as indicated in the selected standard.
- For sizes 600mm and smaller, the valve body and disc will be of centric design.

6.5.1.1.3.2.2 Small Butterfly Valves (Smaller than 600mm NB)

The bodies of small size butterfly valves shall be of the double flange, solid body or wafer type. The valves shall be of grey cast iron to and shall comply with the requirements of the selected standard. Lifting lugs or eye bolts shall be provided for valves above 200 mm NB.

6.5.1.1.3.2.3 Flanges

Valve body can be flangeless, (Wafer pattern), lugged or flanged and must fit between the flange faces flanges in the selected standard. Where the valve is an isolation valve at the end of a line only lugged and flanged versions will be considered.

Body can also be of lugged design for flanges as above.

Should valve be supplied double flanged, the flanges will be raised face and be integral with the body casting in case the body is carbon steel, but will be flat face for cast iron or ductile iron.

For new application preference is given for a SANS Flange conforming to SANS 1123 Pipe Flanges– For replacement valves the flange criteria will conform to that of the installed plant.

6.5.1.1.3.2.4 Discs

General

- The discs shall be of hydrofoil section with smooth continuous surfaces. Valves disc to spindle connection will not be of pinned design, but drive end shaft will have an integral drive connection such as a keyway, square, splined or hexagon drive. The bottom shaft may be held in place by a body pin or end stop connection.
- According to Standard BS EN 593 Industrial valves - Metallic butterfly valves, the manufacturer's technical documentation shall specify trim of reference BS EN 593 Industrial valves - Metallic butterfly valves

Small Butterfly Valves

- Discs for small butterfly valves shall comply with the requirements of the selected standard and be of a material suitable for the fluid or gas being handled, in applications where neither stainless nor carbon steel will resist the effects of chemical attack, the disc will be supplied fully coated. Media properties will be supplied as part of enquiry.

6.5.1.1.3.2.5 Rubber Lining

Supplier shall note the roles and responsibilities as indicated in reference 240-101712128, Specification for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings.

Rubber lining will be selected based on the media flowing through the valve. For compressed air or pneumatic systems EPDM will not be used for liners, as the dry air tends to dry the natural oils out of the EPDM consistency, causing the liner to become brittle.

Preference will be given to designs where the liners are vulcanised to the body or liners that is of replace-able cartridge design, (This cartridge design allows a liner to be vulcanised to a backing ring, and thus provide the benefits of a vulcanised liner, with the extra benefit that the liner cartridge can be replaced. Loose liner valves shall be the last resort, and will only be used on water applications, - all applications were loose liners are offered will be agreed in writing by Eskom.

Loose liner valves must never be used on vacuum service, compressed air system, or any system that uses pneumatic or air as the conveyance media, as the air tends to resonate the liner that will leads to premature failures.

Should a butterfly be used as a block valve at the open end of a pipeline, again only vulcanised or cartridge type liners will be accepted, and then the valve body will be lugged or flanged, thus no wafer pattern will be used on end of line. The liner will also be constructed in such a manner that the liner forms the first seal (gland packing) to the atmosphere between the disc and spindle.

If the applicable Valve Standard is silent or allows for a various options the table below shall be enforced and done according to the 240-101712128 Specification for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with LiningsThe preferred liner material specifications are given in table 7 below.

Table 4: Liner Material Specification

Liner Type	Suitable Media	Temperature Range
Nitrile liner/ Natural black rubber liners	Oils, fuel oils and hydrocarbons	-10°C to 80°C
	Seawater, brines, raw water, cooling water, potable water, air services	-10°C to 80°C
EPDM liner	Steam, hot water, , abrasive slurries	-10°C to 120°C
Viton liner	Most chemicals (refer to chemical	-10°C to 180°C

	resistance charts), hot water and steam and air service	
Stainless steel 316 / 304 disc	Abrasive slurries, hot water, steam, powder with air transportation system, hydro vac, low concentration ash slurries Air service	-10°C to 120°C for wet applications and -10°C to 100°C for dry application.
SG iron / SG iron Nylon coated / Carbon steel nylon coated discs	Oils, fuel oils and hydrocarbons Seawater, brines, raw water, cooling water, potable water Air service	-10°C to 80°C

6.5.1.1.3.2.6 Materials

Materials for the valve components to be as stated in the Standard for the specific fluid.

6.5.1.1.3.2.7 Spindle

The drive shafts are used, each section shall be securely located on the disc for a minimum distance of 1.5 times the shaft diameter. The shafts shall be secured to the disc in such a way as to be capable of transmitting at least 775% of the torsional strength of the minimum required shaft diameter.

Shafts shall be of stainless steel complying with the requirements of the selected standard and may be of the continuous or stub shaft type. If a continuous shaft is used the disc to shaft interface will still be integral drive such as keyway, pinned connections will not be allowed.

Where stub shafts are used, each section shall be securely located on the disc for a minimum distance of 1, 5 times the shaft diameter. The shafts shall be secured to the disc in such a way as to be capable of transmitting at least 75 % of the torsional strength of the minimum required shaft diameter.

6.5.1.1.3.2.8 Manual Operation

Butterfly valves with sizes up to and including DN 200 can be fitted with a flow control wrench of ratchet type. The ratchet plate must be designed as such so that the valve position can be controlled in 10 degree increments from fully closed to fully open.

6.5.1.1.3.2.9 Gearboxes

All butterfly valves from 250mm upwards will be fitted with a gearbox. The gearbox will be self-locking in design, thus preventing the disc to turn unless the hand wheel is operated. Gearbox selection and hand wheel size will be such that no more than 40Newton needs to be exerted on the hand wheel perimeter to operate the valve.

Gearing where specified, shall be supplied with a ratio of at least 3:1 and complying with BS 436-5 Cylindrical gears — ISO system of accuracy. Gearboxes shall be mounted on support brackets If the valve body comprise of a gland stuffing box, where the gland sealing is done by means of the liner and no external gland packing is used the gearbox can be directly mounted (NAMUR).

6.5.1.1.3.2.10 Bearings

Bearings will be provided for valves of DN 350 or larger. The function of the bearing is to carry the axial thrust and therefore spring retaining clips shall not be used.

Self-lubricating sleeve bearings, of a type with a proven record of service, shall be fitted in the valve body hubs, and resilient seals fitted to prevent contact between the bearings and the fluid flowing through the valve. Alternatively, self-lubricating PTFE bearings may be offered.

6.5.1.1.3.2.11 Seals

Where the design is of a clamp in disc, seal design is offered. The seal will be replaceable without having to remove the valve from the pipeline.

6.5.1.1.3.2.12 Electric Actuators

For all butterfly valves, where specified with actuators regardless of valve size, shall have the facility for manual override. During manual operation the actuator motor shall be disengaged from the actuator gearbox.

Electric actuators shall be fitted with both local and remote continuous position indication facilities, and shall be capable of being started both locally and remotely.

Adjustable torque sensing mechanisms and limit switches shall be provided, with back-up mechanical stops which will offer sudden 'infinite' resistance at the limits of disc travel.

Where torque limiting devices are fitted, these shall be set to slip only when the applied torque at the input shaft reaches 160 % of the maximum torque required to operate the valve under normal conditions (but will be less than the maximum torque as specified by the valve supplier to prevent damage to the valve shaft). Such devices shall have prior written approval of Eskom.

The actuator motors shall be rated at least 33 % in excess of the maximum torque required to operate the valve under the most adverse conditions which can be established from this specification. The rated torque shall be at least 20 % less than the stall torque, allowing for a 10 % fluctuation in voltage. All actuator motors shall be protected against thermal overload.

All actuators, with exception to binary actuators, shall be self-locking and capable of holding the disc in any position under all operating conditions, and shall not, under any circumstances, become self-motorized as a result of torque loading on the disc. It shall be possible to fit all actuators with provision for setting the opening and closing times, for various ranges of the valve travel.

Gears shall be manufactured to BS 436-5 Cylindrical gears — ISO system of accuracy and shall be machine cut. All components requiring lubrication shall be totally enclosed in a cast iron weather-proof casing.

6.5.1.1.4 Gate Valves

6.5.1.1.4.1 General Specification

Gate valves for low pressure systems shall comply with an acceptable valve design standard. For new applications valve body designs will be in accordance to SABS 664 for wedge and RSV. For existing applications the face to face dimension will be same as that of the installed plant, and thus to the relevant valve design standard that will satisfy the required face to face dimensions

Gate valves shall generally be of the rising spindle type, unless otherwise specified.. Where non-rising spindles are required, these shall be fitted with double acting plain thrust collars. Unless otherwise specified,

facilities shall be provided to repack glands under pressure. Solid hand wheels are required on all gate valves.

Gate valves shall be used in either the fully open or fully closed position and shall not be used to regulate flow.

6.5.1.1.4.2 Component Specification

Gate valves shall be as specified below:

Up to 300 NB – Rising spindle resilient seal integrally flanged (or non-rising spindle if headroom is inadequate), Above 300 NB- As above but wedge gate (with screwed and pinned seating rings) and with geared spindle drive.

6.5.1.1.4.2.1 Body

- Cast valve bodies shall be of continuous casting with a straight, unobstructed passage. Where possible, disc guides will form an integral part of the valve body.
- For pressure rating below 2MPa body maybe cast iron or ductile iron, however Eskom is phasing out cast iron bodied valves. For Class 150 bodies will be non cast iron or ductile iron, and be castings of carbon or stainless steel, material selection based on line media.

6.5.1.1.4.2.2 Bonnet

- The bonnet shall of valves 50mm and smaller can be screwed, union or bolted type. For valves 40mm and larger the bonnets will be of bolted or pressure seal design. Union and screwed bonnets shall only be used for pipes of sizes ≤65mm.
- The material of the bonnet shall be the same as the material of the valve body.

6.5.1.1.4.2.3 Flanges and other End Connections

Valves of sizes ≤50 DN can have threaded or flanged ends. Valves larger than to 50 DN shall have flanged connections. The flanged ends shall be flat faced (for cast iron or ductile iron) and raised face for carbon or stainless bodied valves.. All flanges shall be integrally cast or forged with the valve body.

6.5.1.1.4.2.4 Gate (Disc)

The gate (disc) of the gate valve shall not obstruct flow when the valve is in the fully open position. Solid-wedge, flexible-wedge or split-wedge discs (also called double discs) may be used. Solid-wedge discs shall be preference for turbulent flow applications.

All gates shall have a drop tight seal over the valve pressure range.

6.5.1.1.4.2.4.1 Gate Guide

- The gate (disc) of the valve shall fit tight enough between the gate guides to prevent any vibrations due to high velocity fluids. Gate guides shall be integrally cast with the gate body.
- All gate guides shall not obstruct the flow through the valve except when valve is used for flow restriction such as the venturi gate valve.

6.5.1.1.4.2.5 Spindle (Stem)

6.5.1.1.4.2.5.1 Extension Spindles

Where extension spindles are required, they shall be supplied complete with wall brackets, headstocks and handwheels. Two universal joints shall be fitted which may be either of the lubricated type with grease retaining and moisture - excluding neoprene gaiters, or of the non-lubricated PTFE or bronze type. Where stem extensions are in excess of 2 meter, the extended spindle design will be such that the weight of the stem extension will not damage the valve.

Headstocks and extended valve spindle handwheelshall be provided with markings showing "OPEN" and "CLOSED" in order that the valve position may be clearly seen. No thrusts shall be taken on the headstocks, which shall act as guides only.

6.5.1.1.4.2.5.2 Rising Stem

Rising stems shall have an external drive nut. Rising stems shall have a position indicator if visual indication of the valve position is inadequate.

6.5.1.1.4.2.5.3 Non-Rising Stem

Non-rising stems shall be used where the vertical space is limited. The valve position shall be indicated by a pointer indicator located at the top of the stem.

6.5.1.1.4.2.6 Seat Ring

The seat of a gate valve should be integralwith the valve body. In the case of a seperable seat ring, the seat ring can be either threaded or pressed, these seraareable seat rings must be located to prevent turning out by means of locking pins.

Welded in body seats or integral casted seats are not preferred.

6.5.1.1.4.2.7 Seal

The seal of any gate valve shall seal in both directions. All gate valves are required to be fitted with a back seal that permits the replacement of stem seals when under pressure.

6.5.1.1.4.2.8 Materials

Materials for the valve components to be as stated in the Standard for the specific fluid.

6.5.1.1.4.2.9 Inspection Covers

Inspection covers shall be provided at the base of all non-resilient seal valves exceeding 300 mm NB in size.

6.5.1.1.5 Check (Non-Return) Valves

Check valves for low pressure systems comply to SANS 1551-1. Check valves (Flanged and wafer types) Part 1 PN series for new installations for existing installations will be dictated by the face to face dimensions.

Single or multi-door type check valves, with or without spring loading, may be of the flanged or wafer type. Ball check and piston lift check valves may also be offered for applications in viscous fluids.

Non spring loaded doors shall have seats inclined at between 50° and 80° from the horizontal centre line. Valves larger than 450 mm NB shall be of the inclined seat type except where the valve duty is better met by spring loaded doors. Where the seats are of a different material to that of the body or door they shall be screwed in and pinned.

Piston type check valves must always be spring loaded.

Flanged valves of cast iron or ductile iron shall be fitted flat face and be installed with full face gaskets, carbon steel or stainless steel flanged valves may be raised face. An exception is that if the valve bolts onto a item such as filter, pump etc. that is cast iron, the valve flange will be flat face. AS cast iron has no ductility by using a raised face flange will for sure cause breakage of the relevant cast iron flange when it is connected to a raised face flange.

Single door check valves shall not be installed in close proximity to pumps and bends.

6.5.1.1.5.1 Component Specification

Check valves shall be as follows:

- Up to 300 mm NB – Wafer type spring loaded (single or double door)
- 350 mm to 600 mm NB – Integrally flange swing door or wafer type spring loaded (single or double door), or ball type
- Above 600 mm NB - Integrally flanged inclined seat swing check valve or spring loaded wafer type with tapped fixing lugs and lifting luge (single or double door).
- Spring-loaded check valves are recommended for use where water hammer prevention is required.
- Preference shall be given to valves that can be inspected and maintained without being removed from the pipeline.
- Check valves are normally installed on pump discharge piping and close proximity to bends or pumps in the line must be avoided. Check valves shall be installed where the flow in the pipeline is fully developed.
- Check valves shall be specified according to the flow conditions in the pipeline.
- Check valves shall have a flow direction arrow indicated on the body.

6.5.1.1.5.2 Type

6.5.1.1.5.2.1 Swing type check valve

Swing check valves shall be fully closed when the pressure differential across the valve is zero. The valves shall be designed in such a way that slamming during closure is minimized. Swing check valves can be used in slight to moderate turbulent flow regimes.

6.5.1.1.5.2.2 Lift Check Valve

Lift check valves are recommended for use in horizontal lines. If lift check valves are installed in vertical or inclined lines, a spring shall be installed in the lift check valve to ensure proper closure. Typical applications are clean water, oil, or laminar flow regimes.

6.5.1.1.5.2.3 Wafer Check Valves

Wafer check valves should be used when swing and lift check valves are too bulk and in low pressure applications.

6.5.1.1.5.2.4 Ball Check Valve

Ball check valves are preferred for use in lines containing viscous fluids, or slight slurries.

6.5.1.1.5.2.5 Flanges

- All valves shall be either flangeless or double flanged. Flanges must be integrally with the valve body and adhere to the standards.
- The flanged ends shall be flat faced (if cast iron or ductile iron)
- Flanges selected will comply with the requirements of the piping design code as installed.
- Flangeless (Wafer) check valves are required to fit between flanges.
- All check valves lager than DN 50 shall be flanged.

6.5.1.1.5.2.6 Bearings

Self-lubricated bearings are preferred. The bearings shall be designed to be able to handle unbalanced thrust on doors.

Bearings are required to retain a low coefficient of friction and offer a long service life.

6.5.1.1.5.2.7 Doors

Doors shall be cast with integral hinge lugs. The travel of the doors shall be restricted by integral stops.

6.5.1.1.5.2.8 Pins

The required continuous hinge pins shall be supported at their ends with bearings. Shafts that protrude through the valve at the non-drive end (NDE) are required to have flanged and bolted bearing cover plates. The continuous hinge pins and bearing cover plates shall be of same material as valve body.

Where shafts enter castings they shall be provided with corrosion resistant bushes to prevent galvanic corrosion.

6.5.1.1.5.2.9 Damping

Damping is required for all check valves.

6.5.1.1.5.2.10 Materials

Materials for the valve components to be as stated in the Standard for the specific fluid.

6.5.1.1.5.2.11 Seats

Elastomer valve seats are preferred.

6.5.1.1.6 Ball Valves

6.5.1.1.6.1 General Specification

Ball valves shall be designed to an acceptable design standard agreed with the Employer.

6.5.1.1.6.2 Component Specification

6.5.1.1.6.2.1 Type

The design of a ball valve will be such that it is acceptable and shall incorporate a combination of the following alternatives:

- Full bore or reduced bore(a medium or short pattern);
- Hollow ball or cylindrical-bore ball;
- One-piece construction or split-body construction;
- Floating or trunnion-supported ball / stem configuration

6.5.1.1.6.2.2 Body

Stainless steel or carbon steel as per line material and line media. The body material shall be suitable for the service and selected from the materials as indicated in the Standard.

6.5.1.1.6.2.3 Body end connections

- Valves 50NB and below shall be either threaded
- Valves above 50NB shall be flanged

6.5.1.1.6.2.4 Ball

The ball material will be either 304, 316 stainless steel with that of the body as required by the selected standard.

6.5.1.1.6.2.5 Stem

The stem shall be manufactured of materials compatible with the ball material to prevent corrosion at ball to stem interface.

6.5.1.1.6.2.6 Seats

For resilient seated valves the seats shall be of PTFE or PTFE composites and designed to maintain sealing geometry under all stated temperature and pressure conditions. The Supplier shall recommend types and grades of synthetic materials for the application.

6.5.1.1.7 Air release valves

6.5.1.1.7.1 General Specification

Ball valves shall be designed to an acceptable design standard agreed with Employer.

6.5.1.1.7.2 Component Specification

Air release valves are to be located at all high points. These valves are to be of the double orifice type.

6.5.2 Electrical

The *Contractor* to ensure that equipment and systems are designed to interface with the existing plant/installation.

The *Contractor* to populate and update the switchgear load schedules as per design and submit to *Employer* for acceptance. The templates to be completed are:

- 240-56227927 Electrical Load List Template
- 240-56356421 Electrical LV Switchgear Schedule Template

6.5.2.1 Switchgear Specifications

a. For all LV switchgear that form part of the scope, the *Contractor* is to comply to the following standards -

- LV Switchgear and Control Gear Assemblies and Associated Equipment for Voltage up to and including 1000V AC and 1500V DC Standard (240-56227516).
- The Wiring of Premises (SANS10142-1)

b. Installation of circuits does not compromise the guarantees and type tests certification of the existing LV Switchgear.

c. Protection relays comply with “List of Approved Electronic Devices to be used on Eskom Power Stations Standard (240-56227589)”. The protection relays must be on the Employer’s approved protection relay list which is contained in the standard “List of Approved Electronic Devices to be used on Eskom Power Stations Standard (240-56227589)”.

d. All current and voltage cables are red, white and blue based on the phase to which they are connected.

e. The switchgears are of the design verified assembly (DVA), free standing, front-operated and rear-access cabling type. Power cables for AC and control cables are bottom entry.

f. All motor starters up to and including 37kW are of the fully withdrawable type assembly. All motors starters are of type II co-ordination and class 10 protections. All drives larger than 37kW are of the fixed type and are installed in the lowest position of the panel or tier.

g. All MCB's will have bolt-on covers i.e. it must require a tool to open the compartment. All MCB's must have individual lockout facility in the off position only.

h. For indication and monitoring, ammeter indication is required on all motors.

i. Ingress protection is as per the standard “LV Switchgear and Control Gear Assemblies and Associated Equipment for Voltage up to and including 1000V AC and 1500V DC Standard (240-56227516)”.

j. The local and remote facility is required on all motor starters.

k. All MCB, fuse curves, CFS curves are provided by the *Contractor*. The *Contractor* provides these curves to the *Employer* in a hard copy format (as part of the technical manual).

l. The *Contractor* must provide a test bench for withdrawl circuits. This bench will be used to test the withdrawal functional circuits.

6.6 Process control and IT works

6.6.1 C&I

6.6.1.1 General

1. The *Contractor* provides all equipment and services and executes all work necessary to fulfil all requirements specified in this works information.
2. The C&I design shall be consistent and integrated to the current C&I system at WTP for monitoring purposes.
3. The C&I Systems shall be configured as a fully Operational System and shall be workable in all respects and shall be implemented in a consistent and integrated manner, for fully operational functionality.
4. The detailed scope of supply for the works information is defined by a combination of Performance, Functional and Equipment Specifications such that a complete functioning system shall be provided.
5. The *Contractor* supplies new Operating Training Procedures, for all engineered C&I Systems as per Works Information.
6. The *Contractor* provides a C&I system that fulfils all functions stated as per process requirements.

6.6.1.2 Field Design

The *Contractor* ensures that field installation inclusive of instrumentation, junction boxes, cabling and racking shall be properly labelled with permanent labels that will not be effortlessly removed. All field equipment shall be selected according to the environment in which they will operate in. All labelling shall be consistent throughout the plant as per Lethabo Labelling Standard. Field device labels must be made of stainless steel, text on labelling be engraved as per the 240-56355754: Field Instrument Installation Standard. Additional protection hoods and enclosures must protect those transmitters situated outdoors or in adverse environments.

Signal Cabling and Trunk Cabling

UGV cable and field/trunk cable installations will be used to transfer instrumentation from the field to I/O according to 240-56355815: Field Instrument Installation Standard: Junction Boxes and Cable Termination.

Junction Boxes

All new Junction boxes shall be properly labelled with permanent labels that will not be effortlessly removed. The *Contractor* shall follow 240-56355815: Field Instrument Installation Standard: Junction Boxes and Cable Termination.

6.6.1.3 Control System Design

The *Contractor* interfaces to the existing Control System Design (Controller/PLC) that will monitor the plant and provides *Eskom* with a control philosophy. *Eskom* will implement the given control philosophy and required HMI on the DCS.

I/O Modules

Existing I/O modules will be used, *Contractor* to provide additional if need arise for new signals on all process interfaces. As a minimum, the following I/O signals are catered for:

- Analogue Inputs (4 – 20 mA), 2- and 4-wire configuration
- Analogue Outputs (4 – 20 mA)
- Digital Inputs (24 VDC) for feedback monitoring
- Digital Outputs (24 VDC)

6.6.1.4 C&I Power Distribution

The *Contractor* interfaces to the current power distribution system of 24 VDC rectifiers and 220 VAC currently used for WTP.

6.6.1.5 Testing and Commissioning

Testing shall adhere to at least the minimum requirements set by IEC 62381 (Automation Systems in the Process Industry - Factory Acceptance Test (FAT), Site Acceptance Test (SAT), and Site Integration Test (SIT)). As a minimum, the following functions are required to be tested.

- Instrument calibration, settings and configurations for all transmitters
- Alarms

Each of the aforementioned shall have dedicated test procedures and documents necessary for testing.

6.6.1.6 Spare Capacity in Enclosures, Trunking, Conduits, and Racking

The *Contractor* provides trunking, junction boxes, enclosures and racking to have 20% spare capacity, rounded up. All conduits are required to have 50% spare space capacity, rounded up.

6.6.1.7 Earthing and Lighting Protection

The *Contractor* implements the correct earthing concept for reliable operation. All earthing concepts follows as a minimum the OEM best practices and 240-56356396: Earthing and Lightning Protection Standard to ensure safe and reliable operation. The integrity of the earthing system is tested upon completion of the C&I installation to ensure compliance.

6.6.1.8 C&I Documentation

The *Contractor* is required to provide the following engineering documents as part of his/her design for C&I according to the C&I Documentation Requirements from Vendors Template 240-85521112:

- Drive and Actuator Schedule: The *Contractor* is responsible for the engineering of the Drive and Actuator Schedules, in compliance the Design Requirements.
- Instrument Schedule: The *Contractor* is responsible for the engineering of the Instrument Schedule, in accordance with the Design Requirements.
- Panel Interface List: The *Contractor* is responsible for the engineering of the Panel Interface Lists and its respective Interface Engineering.
- Virtual Signal List: The *Contractor* is responsible for the engineering of the Virtual Signal List for all networked interfaces, in accordance with the Design Requirements.
- Limit Of Supply and Services: The *Contractor* is responsible for the engineering of the Limit Off Supply and Services, in accordance with the Design Requirements.
- C&I Design: The *Contractor* is responsible for the engineering of the C&I Design, in accordance with the Design Requirements
- Preliminary cable rack design and routes: The *Contractor* is responsible for the engineering of the Preliminary cable rack design and routes, in accordance with the Design Requirements.
- Preliminary cable schedules: The *Contractor* is responsible for the engineering of the Preliminary cable rack design and routes, in accordance with the Design Requirements.

- Preliminary IO count: The *Contractor* is responsible for the engineering of the Preliminary I/O count in accordance with the Design Requirements.
- Power Supply/Reticulation Concept: The *Contractor* is responsible for the engineering of the Preliminary cable rack design and routes, in accordance with the Design Requirements.
- Intrinsic safety methodology and calculations.
- FAT Procedure (preliminary): The *Contractor* is responsible for the engineering of the FAT Procedure (preliminary), in accordance with the Design Requirements.
- Operational Acceptance Test Procedure (preliminary): The *Contractor* is responsible for the engineering of the Operational Acceptance Test Procedure, in accordance with the Design Requirements.
- Project Drawings: The *Contractor* is responsible for the engineering of the C&I Drawings of all affected loops in an Intergraph SmartPlant compatible format, PDF, DWG and hard copies; in accordance with the Design Requirements.
- Function IO Block Diagram: The *Contractor* is responsible for the engineering of the C&I Function IO Block Diagram, in accordance with the Design Requirements.

6.7 Other [as required]

Primary Coolers (economiser inlet, boiler water, saturated steam and superheated steam) at units 1 and 2 to be considered for re-use and to be integrated into the new design and specification as far as possible.

7. List of drawings

7.1 Drawings issued by the *Employer*

All available drawings related to this project will be issued to *The Contractor* as required.

Note all relevant drawings and standards will be made available to *The Contractor* as soon as they have completed and submitted LFM582 – Intellectual Property Protection

PART 4: SITE INFORMATION

Document reference	Title	No of pages
	This cover page	1
C4	Site Information	13
	Total number of pages	14

C4 Site Information

C4.1: Information about the *site* at time of tender which may affect the work in this contract:

1. Site Procedures and Regulations

1.1 Site location and Security

- The Site is at Lethabo Power Station situated ± 18 km South of Vereeniging on the Viljoensdrift - Deneysville Road, Free State. Access to the site will be via the main security gate only.
- The *Employer* will inform the *Contractor* of the access procedures, and it should be expected that such procedures may change depending on the prevailing security situation.
- The *Contractor* to allow in his price and program for delays at the security gate. The *Employer* reserves the right for its Security personnel to search persons or vehicles entering or leaving the premises. This includes, but is not limited to briefcases and toolboxes.

1.2 Temporary Gate Permits

- The *Contractor* provides the *Employer* with the personal details of their staff at least two days prior to the occupation date. All names and details to be submitted to the *Employer* who arranges for all gate permits.

1.3 Occupational Health and Safety Induction Course

- All the employees of the *Contractor* must attend a health and safety induction course provided by the *Employer* at the security offices before they will be allowed to work on the Site. It is the responsibility of the *Contractor* to ensure that all employees have attended the health and safety induction.

- The Induction course includes an awareness on the Error prevention and Improvement tools and techniques to ensure familiarisation and use of these error-prevention tools/techniques inclusive of, Pre and Post-job briefs, Risk Assessments, Self-checks (STAR principle), Peer Checks, Job observations, Accountability, Effective communications e.g. 3- way, Questioning attitude, Procedural adherence, Hand overs and other.

- A list of employees requiring safety induction must be submitted at least 2 days in advance arrival so that the details of the safety and health induction course can be communicated.

1.4 Health and Safety Requirements

The *Contractor* and his sub-*Contractor*s ensure at all times compliance with safety regulations imposed by any Act of Parliament, ordinance or any regulation or by-law of any local or statutory authority. The *Contractor* acts in accordance with the health and safety requirements stated in the Works Information.

- In carrying out its obligations to the *Employer* in terms of this contract; in providing the Works; in using Plant, Materials and Equipment; and while at the Site for any reason, the *Contractor* complies and procures and ensures the compliance by its employees, agents, Sub-*Contractor*s and mandataries with:

- the provisions of the Occupational Health and Safety Act 85 of 1993 (as amended) and all regulations in force from time to time in terms of that Act (“the OHSA”); and the Eskom “Health, Safety and Environmental specifications for *Contractor*s” document attached to the Works

Information (as amended from time to time) and such other Eskom Safety Regulations as are applicable to the Works and are provided in writing to the *Contractor* (collectively "the Eskom Regulations"). The Eskom Regulations may be amended from time to time by the *Employer* and all amendments will be provided in writing to the *Contractor*. The *Contractor* complies with the provisions of the latest written version of the Eskom Regulations with which it has been provided; and the health and safety plan prepared by the *Contractor* in accordance with the SHEQ Requirements

(The OHSA and the Eskom Regulations are collectively referred to as the "SHEQ Requirements".)

- The *Contractor,* at all times, considers itself to be the "*Employer*" for the purposes of the OHSA and shall not consider itself under the supervision or management of the *Employer* with regard to compliance with the SHEQ Requirements, the *Contractor* shall furthermore not consider itself to be a subordinate or under the supervision of the *Employer* in respect of these matters. The *Contractor* is at all times responsible for the supervision of its employees, agents, Sub-*Contractor*s and mandataries and takes full responsibility and accountability for ensuring they are competent, aware of the SHEQ Requirements and execute the Works in accordance with the SHEQ Requirements.

- The *Contractor* acknowledges that it is fully aware of the requirements of all the above and undertakes to employ only people who have been duly authorized in terms thereof and who have received sufficient training to ensure that they can comply therewith.

- The *Contractor* ensures that all statutory appointments and appointments required by any Eskom Regulations are made and that all appointees fully understand their responsibilities and is trained and competent to execute their duties. The *Contractor* supervises the execution of their duties by all such appointees.

- The *Contractor* shall appoint a person who will liaise with the Eskom Safety Officer responsible for the premises relevant to this contract. The person so appointed shall, on request: supply the Eskom Safety Officer with copies of minutes of all Health And Safety Committee meetings, whenever he is required to do so; supply 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 shall advise the Eskom Safety Officer of any changes thereto.

  The *Employer*, or any person appointed by the *Employer*, may, at any stage during the duration of this contract:

  - conduct health and safety audits regarding all aspects of compliance with the SHEQ Requirements, at any off-site place of work, or the site establishment of the *Contractor;*
  - refuse any employee, Sub*contractor* or agent of the *Contractor* access to the premises if such person has been found to commit an unsafe act or any unsafe working practice or is found not to be qualified or authorised in terms of the SHEQ Requirements;
  - Issue the *Contractor* with a stop order should the *Employer* become aware of any unsafe working procedure or condition or any non-compliance with any provision of the SHEQ Requirements.
  - The *Contractor* immediately reports any disabling injury as well as any threat to health or safety of which it becomes aware at the Works or on the Site to the *Employer's Representative.*

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

- The *Contractor* appoints a person, qualified in accordance with the SHEQ Requirements, as the liaison with the Eskom Safety Officer for all matters related to health and safety, this person shall be contactable 24 hours a day.

- The *Contractor* confirms that it has been provided with sufficient written information regarding the health and safety arrangements and procedures applicable to the Works to ensure compliance by it and all employees, agents, Sub-*Contractor*s or mandataries with the SHEQ Requirements while providing the Works in terms of this contract. As such, the *Contractor* confirms that this contract and the relevant Eskom Regulations referred to in this contract constitute written arrangements and procedures between the *Contractor* and the *Employer* regarding health and safety for the purposes of section 37(2) of the OHSA.

- The *Contractor* agrees that the *Employer* is relieved of any and all of its responsibilities and liabilities in terms of Section 37(1) of OHSA in respect of any acts or omissions of the *Contractor*, and the *Contractor*'s employees, agents or Sub-*Contractor*s, to the extent permitted by the OHSA.

- The *Contractor* hereby indemnifies the *Employer* and holds the *Employer* harmless in respect of any and all loss, costs, claims, demands, liabilities, damage, penalties or expense that may be made against the *Employer* and/or suffered or incurred by the *Employer* (as the case may be) as a result of, any failure of the *Contractor*, its employees, agents, Sub-*Contractor*s and/or mandataries to comply with their obligations in terms of clause 16, and/or the failure of the *Employer* to procure the compliance by the *Contractor* , its employees, agents, Sub*Contractor*s and/or mandataries with their responsibilities and/or obligations in terms of or arising from the OHSA.

    - In carrying out his obligation as the mandatory to the *Employer* for this contract in terms of the National Environmental Management Act No.107 of 1998, the *Contractor* ensures that he complies with the Act when Providing the Services or using plant, materials or equipment.

Cost: Contractor does not submit a financially viable tender	The rates will be negotiated.	Medium
Scope: Non-response to tenders	Scope to be clearly stated as well as supply all drawings and technical specification required to clarify the scope.	Medium
Non-performance as per SoW	The qualifications of individuals recruited and experience to be scrutinised by the Employer as part of the Contract conditions before a specific skill resource starts working.	Medium
People: Incompetent people working on the contract	The minimum competency requirement has been stipulated in the evaluation criteria for the tenders. Contractor has to satisfy this requirement before a skills resource start working	Medium
Safety: Contractor not complying with Eskom Safety requirements.	• The successful contractor shall be expected to have OHS system that is aligned to the clients. • The contractor shall be expected to conduct task risk assessment and pre-job briefs every time before performing work. • The contractor must ensure that they align themselves with the requirements of PTW wherever it issued. • Strict adherence to the PPE requirement must be adhered to by the contractor • The contractor shall prepare a safety	High

	file for approval by Safety Risk Management before work commences. • SHE file will be put in place by the contractor and the Contractor's SHE Officer will be responsible for cascading the content and enforce the compliance to the rest of the employees.	
Environment: Contractor not complying with Eskom Environmental requirements.	• Contractor to be familiarized with Eskom SHEQ Policy • SHE File to be approved by the Environmental department. • Contractor to be ISO14001:2015 compliant. • Contractor shall familiarise him/herself with the Environmental procedures related to the activity. • Self-audits during work execution will be conducted weekly whereby environmental risks are identified. • Environmental awareness to be conducted through toolbox talks. • Contractor shall report all incidents or risks whilst on the job to the Eskom Project leader who will inform the environmental department. • Contractor shall comply to the following environmental procedures: o LBE23003 Environmental non-conformance; investigation and reporting o LBE22005 Environmental spill management procedure o LBE22004 Environmental waste management procedure	Medium
Quality: **Product packaging and transportation to the client**	• Supplier must ensure that product is packaged and transported in such a way that it safe, well stacked and preserved. The service provider to provide method statements and quality control plans. Site Acceptance Test and System Integration tests to be conducted.	High
Quality Management Document Requirements	• A fully detailed Quality Control Plan (QCP) for acceptance within three (3) weeks of the Contract Date, which details all the aspects of the quality management system to be applied. It includes the methods that will be utilized to ensure quality assurance, control and improvement of the identified activities as stated in the Scope of Works.	High
Non-Conformance and Defects	• NCR's and defects notifications are issued; the Service provider will acknowledge the receipt within 48 hours	Medium

	and proposes corrective and preventive actions to the client as per the contract response period. The corrective and preventive actions will include the implementation and completion dates.	
Document Control	• All documents and records management should be performed according to Technical Document and Record Management Work Instruction (240-76992014). The Project Manager ensures that the service provider is provided with the latest revision.	Medium
Failure to include necessary returnable or adhere to the tender requirements may result in delays from the awarding process	• The supplier is required to submit all documentation specified under Category 2.	Medium

1.5 Permit to Work System

- NO work shall be carried out without a "PERMIT TO WORK"

- The *Contractor*'s Responsible Person must satisfy himself that all sources of possible danger are isolated. Details of the Permit to Work system can be found in the Plant Safety Regulations for Lethabo Power Station, Eskom. The *Contractor* must also make provision for sufficient Authorise Supervisor(s) depending on the contractual obligations. The Authorised Supervisor will need to undergo a week's training, which will be arranged at a suitable Eskom facility. This person must also pass an exam to verify his understanding of the procedure, after which he/she will need to be interviewed by a panel to discuss the practical understanding of being appointed as an Authorised Supervisor.

- A Master Permit to Work is used on declared major outages, details can be found in local procedure LBA 00085. Permit changes are made during the dead time, if it is required by the *Contractor* that a certain supply be made available or plant tested than this can be applied for at the Outage Management Meeting at least 1 day in advance.

- Plant with a prohibitive sign attached may only be operated by appointed Eskom personnel. Any *Contractor* employee found tampering with such plant will be permanently removed from Site.

1.6 Transportation of passengers: open LDV's:

No *Eskom employee* or *Contractor* would be allowed to transport passengers on the back of open light delivery vehicles (LDV's). It is a legal requirement to provide safe transportation of *Eskom* and *Contractor* employees – therefore the following will be enforced:

- All passengers must be transported in a closed vehicle with proper and adequate Seating, fitted with safety belt for the number of passengers to be transported.
- Tools and equipment must be properly secured.
- Only authorised drivers may transport passengers.
- Proof must be submitted on request in terms of valid roadworthiness of all vehicles
- The above must apply to on site and off site transportation of passengers.

1.7 Eskom Life Saving Rules:

Life Saving Rules have been developed that will apply to all Eskom *Employees*, agents, consultants and *Contractor*s.

Rule 1: Open, Isolate, Test, Earth, Bond, and/or Insulate before touch - that is any plant operating above 1 000 V.
Rule 2: Hook up at heights - no person may work at height where there is a risk of falling.
Rule 3: Buckle up – no person may drive any vehicle on Eskom business and/or on Eskom premises: unless the driver and all passengers are wearing seat belts.
Rule 4: Be sober (no person is allowed to work under the influence of drugs and alcohol.
Rule 5: Use a permit to work – where an authorization limitation exists, no person shall work without the required permit to work.
Rule 6: No person is allowed to text/talk on cell phone as this distracts attention

1.8 Local Safety Procedures

The *Contractor* adheres to all local procedures. A list of local procedures is available on request from the *Employer.*

1.9 Incidents / Accidents

- Incidents and accidents must be reported and investigated as detailed in LBA 00030. All incidents must also be reported to the *Employer* within 24 hours.

- First aid must be made available either by the *Contractor* or use can be made of the Lethabo medical centre at a fee. The availability of the *Contractor's* own first aid does not relieve the *Contractor* of his obligation to report and investigate the incident in accordance with Lethabo Procedure.

- The *Employer* will accompany the *Contractor* to hospital in the case of serious injury.

1.10 Fire Prevention

- Fire prevention and protection requirements to which *Contractor*s must comply are detailed in LBA 00030.

1.11 Protective Equipment and Clothing

- The *Contractor* supplies his own personal protective equipment necessary to carry out the *works* and the *Contractor* shall ensure that all overalls for his staff have clearly identifying **company LOGO's**

- The *Contractor* is also responsible to inspect and maintain such equipment as required in terms of the OHS Act and local procedures.

1.12 Inspection of Equipment

- The *Contractor's* equipment is inspected by an authorised Eskom employee on arrival at the site.

- The following documentation is required to accompany the equipment where applicable: copies of all test certificates and maintenance records.

- Lifting equipment and electrical equipment must be marked with a unique number, code or colour code for identification. If the equipment is found to be in an unsatisfactory condition or if insufficient maintenance has been carried out on the equipment then it will not be approved for use on Site. A list of all lifting equipment and electrical equipment must be submitted to the *Employer* at least 2

days prior to the occupation date. This list must indicate the unique number and description of the equipment.

- Training requirements must comply with the Works Information and statutory requirements.

1.13 Documentation

The *Contractor* is responsible to have the following documentation available on site in accordance with LBA 00030:

- A copy of the OHS Act.
- Copies of all site accident report forms as required by the OHS Act.
- Copies of minutes of health and safety meetings held on site.
- Copies of inspection reports produced by the accident prevention officer.
- Copies of attendance registers for all incidents or work stoppages

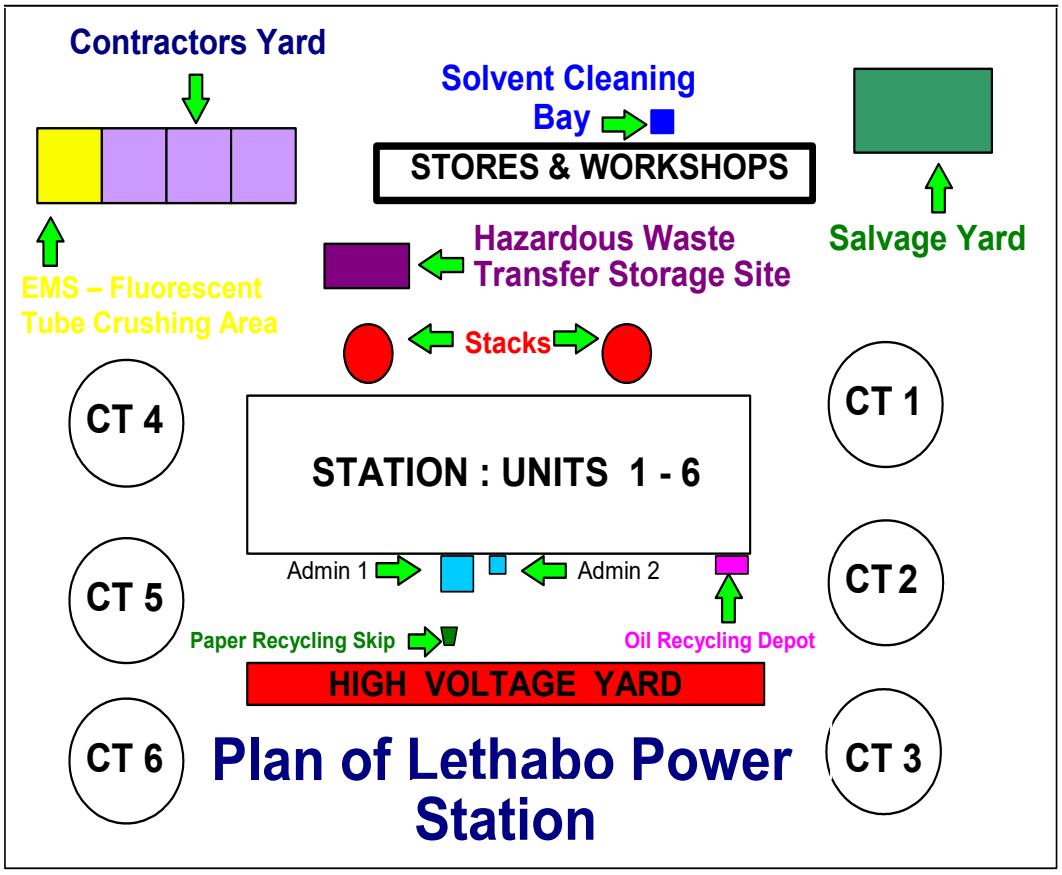
1.14 Environmental Policy and Waste Handling

The *Contractor* shall submit an Environmental Management Plan (EMP) to be reviewed and approved by Eskom environmental officer, one week before the commencement of works if required as per the Works Information.

1.15 Disposal of Waste

Waste shall be removed promptly to the designated disposal area as per below requirements:

- Domestic waste to the white waste bins
- No stockpiling will be permitted
- Production waste in the marked bins i.e. coal and ash only
- Paper in its recycling bin
- Contact Civil Engineering for the disposal of building rubble
- Scrap metal, Wood & Rubber, Redundant Valves, Pipes, and Equipment etc. to be placed in the marked bins in the Salvage Yard. Solvents and cloths used to the Cleaning Bay.



1.16 Hazardous Waste Disposal and Handling

- Any new hazardous waste that comes to the temporary hazardous waste site must be accompanied by an SDS; all other hazardous waste can be delivered without the SDS.
- An inventory is signed by the person who delivers the hazardous waste and the waste coordinator must acknowledge the receipt of the waste.
- A 210l drum with lid will be issued to the person who has delivered the waste after the inventory is signed.
- Drums with incorrect colour coding or drums without lids will not be accepted at the temporary hazardous waste site.

2. Additional General information

LBS00067 to be used as it contains statutory requirements as well as the minimum SHE requirements to which Eskom employees and contractors must comply whilst performing work on the premises of Lethabo Power Station.

The purpose of the procedure is to assist the Contract Supervisor or Project Manager, and the contractor to develop, implement and maintain an organised Safety, Health and Environment Management Plan performing work.

Contractors are accountable for taking all the necessary steps to protect all persons (including employees, visitors, and the general public), to protect the environment and property against any harm during the course of performing work or services in relation to their contractual obligations. In addition, all work procedures and equipment will be carried out in accordance with Eskom and legislative requirements.

Eskom's contractors have the fundamental accountability and responsibility for executing on-site safety, health, and environment issues for their activities, services, products, and work. Each contractor is responsible for ensuring that its employees and the employees of any appointed contractors comply with all occupational safety, health, and environmental (SHE) statutory requirements and the policies and procedures of Eskom Holdings SOC Limited.

This procedure is supplementary to the requirements of relevant legislation and the conditions of the contract.

2.1 Plant & Materials

- The *Employer* may at his own discretion, supply any Plant and Materials as may be required by the *Contractor* to Provide the Works.
- The *Contractor* is to notify the *Employer* in writing, 48 hrs in advance, of such Plant and Materials required.

2.2 Equipment or Material Access and Removal

2.2.1 Access

- The *Contractor* ensures that all equipment and materials brought through the security gate is signed in at the main security gate on an OV18 form.

2.2.2 Removal

- The *Contractor* is not allowed to remove any equipment or materials from site without producing the relevant OV18 forms or the equipment lists. (Security Access Sign In)
- If the equipment or material is to be removed the same day, on which they were brought on to site, then the OV18 form will need to be produced at the gate when leaving the site.
- If the equipment or material is removed after this time then a Non-Returnable Gate Release will be provided by the *Employer's Representative*, on receipt of the original OV18, with which the *Contractor* brought the equipment on site.

2.2.3 Site or Area Establishment and Evacuation

2.2.3.1 Application for Site Establishment:

- Sites are allocated according to availability, the period for which the *Contractor* is going to be on site, or if special circumstances warrant the allocation of a site. Documentation to support this application to be submitted as stipulated below

- The location of the site or area is indicated during the site or area take-over inspection.

2.2.3.1 Site Establishment:

- The *Contractor* does not occupy any site or area other than that allocated to him.
- The *Contractor* does not occupy the site or area prior to the take-over inspection.
- The *Contractor* maintains the site or area provided to him to the satisfaction of the *Employer*. A site inspection to be conducted by both parties prior to site establishment
- The *Employer* will require full access at all times of the *Contractor's* site or area for inspection.

- The *Contractor* will remain accountable for the security of his designated site area. The *Employer* will accept no accountability for any theft, losses or damage under the *Contractors*' control

2.2.3.2 Site De Establishment:

- The *Contractor* advises the *Employer* in writing, five (5) days prior to site de establishment in accordance with LBA 00030.
- Site de establishment cannot proceed without the approval of the *Employer* in writing. Final payment and the first portion of the retention (where applicable) will not be released if not supported by the *Employer*, as this is seen as part of the works.

2.2.4 Information Required for Site Establishment:

- Note that the below will be based on the Contractor's planning for execution of the works. The price schedule should be completed as per required Section A
- The information supplied will assist in site allocation

Description	**Quantity**	**Comments: Contractor to explain quantity requirements**
Equipment:		
Container		
Store		
Vehicle		
Generator		
Plant equipment (i.e. crane, forklift, hoisting equipment)		
Ablution Facilities		
Other		
People: (where applicable)		
Site Manager		
Safety Officer		
Supervisor		
Storeman		
Artisan		
Electrician		
Welder		
Semi-Skilled		
General Labourers		
Other		
Materials: (where applicable)		
Oil		

Cleaning Equipment		
Hazardous Material		
Other: (where applicable)		
Hot work permit requirement		