NEC3 Engineering & Construction Contract

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

and

For **Ex-GE Store Perimeter Protection Scope at Kusile Power Station for a Period of 1 Year**

Contents: **No of pages**

Part C1 **Agreements & Contract Data**

Part C2 **Pricing Data**

Part C3 **Scope of Work**

Part C4 **Site Information**

CONTRACT No.

Part C1: Agreements & Contract Data

Contents: **No of pages**

C1.1 Form of Offer and Acceptance

[to be inserted from Returnable Documents at award stage]

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

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

[to be inserted from Returnable Documents at award stage]

C1.3 Proforma Guarantees

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:

Ex-GE Store Perimeter Protection Scope at Kusile Power Station for a Period of 1 Year

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 B	The offered total of the Prices exclusive of VAT is	**R**
	Sub total	**R**
	Value Added Tax @ 15% is	**R**
	The offered total of the amount due inclusive of VAT is[1]	**R**
	(in words)	

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

Signature(s) .....

Name(s) .....

Capacity .....

For the tenderer:

.....
(Insert name and address of organisation)

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

Tenderer's CIDB registration number (if applicable) .....

[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	**[●]**	**[●]**
5	**[●]**	**[●]**
6	**[●]**	**[●]**
7	**[●]**	**[●]**

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

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

	For the tenderer:	**For the Employer**
Signature		
Name		
Capacity		
On behalf of	*(Insert name and address of organisation)*	*(Insert name and address of organisation)*
Name & signature of witness		
Date		

C1.2 ECC3 Contract Data

Part one - Data provided by the *Employer*

Clause	Statement	Data
1	**General**	
	The *conditions of contract* are the core clauses and the clauses for main Option	
		B: Priced contract with bill of quantities
		W1: Dispute resolution procedure
	dispute resolution Option	
	and secondary Options	
		X2 Changes in the law
		X5: Sectional Completion
		X7: Delay damages
		X15: Limitation of *Contractor's* liability for design to reasonable skill and care
		X16: Retention
		X 18: 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: (Name)	**Zanele Kubheka**
	Address	**Kusile Power Station, R545 Balmoral/Kendal Road, Haartebeesfontein Farm, Witbank**

	Tel	**013 699 7838**
	Fax	**N/A**
	e-mail	**KubhekZa@eskom.co.za**
10.1	The *Supervisor* is: (Name)	**Zintle Moloto**
	Address	**Kusile Power Station, R545 Balmoral/Kendal Road, Haartebeesfontein Farm, Witbank**
	Tel No.	**014 163 8654**
	Fax No.	**N/A**
	e-mail	**JackZ@eskom.co.za**
11.2(13)	The *works* are	**Ex-GE Store Perimeter Protection Scope at Kusile Power Station for a Period of 1 Year**
11.2(14)	The following matters will be included in the Risk Register	**1. Dust Inhalation 2. Slip, Trip & Fall 3. Falling Objects 4. Electric Shock 5. Permit to Work 6. Working at heights 7. Quality 8. Time**
11.2(15)	The *boundaries of the site* are	**Ex GE Stores**
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	**3 days**
2	**The *Contractor's* main responsibilities**	**Data required by this section of the core clauses is provided by the *Contractor* 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	**Will be determined by the Outage start date**
11.2(9)	The *key date*s and the *condition*s to be met are:	

	***Condition* to be met**	***key date***
1	**Submit Programme for approval**	**2 Weeks after Kick off meeting**
2	**Submit QCP's**	**2 weeks after Kick off**

				meeting
		3	**Submit safety file for approval**	**2 Weeks after kick off meeting**
			All tools & equipment to be used to be readily available and inspected	**As soon as safety file is approved**
30.1	The *access dates* are:	**Part of the Site**		**Date**
		1	**Kick Off Meeting**	**After Contract Award**
			Kusile Admin Building	**After Safety File Approval**
		2	**Ex GE Stores**	**2 Days after Site Establishment and Permit to work approval**
31.1	The *Contractor* is to submit a first programme for acceptance within	**5 days after the kick off meeting**		
31.2	The *starting date* is	**Contract Signature date**		
32.2	The *Contractor* submits revised programmes at intervals no longer than	**5 days**		
35.1	The *Employer* is not willing to take over the *works* before the Completion Date.	**The takeover will be after the completion of each unit**		

4 Testing and Defects

42.2	The *defects date* is	**52 weeks after Completion of the whole of the *works*.**
43.2	The *defect correction period* is	**10 days After the Contractor being notified**

5 Payment

50.1	The *assessment interval* is	**On the 25th day of each successive month.**
51.1	The *currency of this contract* is the	**South African Rand.**
51.2	The period within which payments are made is	**4 weeks.**
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:	**Kusile Power Station**
	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	
	The *weather data* are the records of past *weather measurements* for each calendar month which were recorded at:	
	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:	**N/A**
7	**Title**	
8	**Risks and insurance**	

80.1	These are additional *Employer*'s risks	**Late design approval, late equipment supply, and commencement of the works.**
9	**Termination**	
10	**Data for main Option clause**	
B	**Priced contract with bill of quantities**	
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).**
	Address	**[●]**
	Tel No.	**[●]**
	Fax No.	**[●]**
	e-mail	**[●]**
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**	
X2	**Changes in the law**	
X5	**Sectional Completion**	

X5.1	The *completion date* for each *section* of the *works* is:	***Section***	**Description**	***Completion date***

		1	**Project Execution & Commissioning & Hand Over Ex GE Store Perimeter Protection**	***30-Jan-26***
X5 & X7	**Sectional Completion and delay damages used together**			
X7.1 X5.1	Delay damages for late Completion of the *section*s of the *works* are:	***section***	**Description**	**Amount per day**
		1	**Project Execution & Commissioning & Hand Over Ex GE Store Perimeter Protection**	**1% of Contract Value**
	Remainder of the *works*			
	The total delay damages payable by the *Contractor* does not exceed:	**10% of the Contract Value**		
	Limitation of the *Contractor*'s liability for his design to reasonable skill & care			
	Retention (not used with Option F)			
X16.1	The *retention free amount* is	**R0**		
	The *retention percentage* is	**5% for every assessment**		
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)**		
	For any one event, the *Contractor*'s liability to the *Employer* for loss of or damage to the *Employer*'s property is limited to:	**the amount of the deductibles relevant to the event**		
	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** **the amounts excluded and unrecoverable from the *Employer*'s assets policy for correcting the Defect (other than the resulting physical damage which is not excluded) plus the applicable deductible as at contract date.**		
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) 5 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 Z15 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

Z3.1 **Change of Broad Based Black Economic Empowerment (B-BBEE) status**

Z3.2 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.

Z3.3 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*.

Z3.4 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.

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 Confidentiality

Z4.1 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.

Z4.2 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.

Z4.3 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*.

Z4.4 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.

Z4.5 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*.

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

Z5 Waiver and estoppel: Add to core clause 12.3:

Z5.1 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.

Z6 Health, safety and the environment: Add to core clause 27.4

Z6.1 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.

Z6.2 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.

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

Z7.1 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.

Z7.2 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.

Z7.3 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.

Z8 Notifying compensation events

Z8.1 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".

Z9 *Employer's* limitation of liability

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

Z9.2 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.

Z10 Termination: Add to core clause 91.1, at the second main bullet point, fourth sub-bullet point, after the words "against it":

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

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

Z11.1 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.

Z12 Ethics

For the purposes of this Z-clause, the following definitions apply:

Affected Party means, as the context requires, any party, irrespective of whether it is the *Contractor* or a third party, such party's employees, agents, or Subcontractors or Subcontractor's employees, or any one or more of all of these parties' relatives or friends,

Coercive Action means to harm or threaten to harm, directly or indirectly, an Affected Party or the property of an Affected Party, or to otherwise influence or attempt to influence an Affected Party to act unlawfully or illegally,

Collusive Action means where two or more parties co-operate to achieve an unlawful or illegal purpose, including to influence an Affected Party to act unlawfully or illegally,

Committing Party means, as the context requires, the *Contractor*, or any member thereof in the case of a joint venture, or its employees, agents, or Subcontractor or the Subcontractor's employees,

Corrupt Action means the offering, giving, taking, or soliciting, directly or indirectly, of a good or service to unlawfully or illegally influence the actions of an Affected Party,

Fraudulent Action means any unlawfully or illegally intentional act or omission that misleads, or attempts to mislead, an Affected Party, in order to obtain a financial or other benefit or to avoid an obligation or incurring an obligation,

Obstructive Action means a Committing Party unlawfully or illegally destroying, falsifying, altering or concealing information or making false statements to materially impede an investigation into allegations of Prohibited Action, and

Prohibited Action means any one or more of a Coercive Action, Collusive Action Corrupt Action, Fraudulent Action or Obstructive Action.

Z12.1 A Committing Party may not take any Prohibited Action during the course of the procurement of this contract or in execution thereof.

Z12.2 The *Employer* may terminate the *Contractor*'s obligation to Provide the Services if a Committing Party has taken such Prohibited Action and the *Contractor* did not take timely and appropriate action to prevent or remedy the situation, without limiting any other rights or remedies the *Employer* has. It is not required that the Committing Party had to have been found guilty, in court or in any other similar process, of such Prohibited Action before the *Employer* can terminate the *Contractor*'s obligation to Provide the Services for this reason.

Z12.3 If the *Employer* terminates the *Contractor*'s obligation to Provide the Services for this reason, the amounts due on termination are those intended in core clauses 92.1 and 92.2.

Z12.4 A Committing Party co-operates fully with any investigation pursuant to alleged Prohibited Action. Where the *Employer* does not have a contractual bond with the Committing Party, the *Contractor* ensures that the Committing Party co-operates fully with an investigation.

Z13 Insurance

Z 13.1 Replace core clause 84 with the following:

Insurance cover **84**

84.1 When requested by a Party, the other Party provides certificates from his insurer or broker stating that the insurances required by this contract are in force.

84.2 The *Contractor* provides the insurances stated in the Insurance Table A.

84.3 The insurances provide cover for events which are at the *Contractor*'s risk from the *starting date* until the earlier of Completion and the date of the termination certificate.

INSURANCE TABLE A

Insurance against	Minimum amount of cover or minim limit of indemnity
Loss of or damage to the *works*, Plant and Materials	The replacement cost where not covered by the *Employer*'s insurance The *Employer*'s policy deductible, as Contract Date, where covered by the *Employer*'s insurance
Loss of or damage to Equipment	The replacement cost
Liability for loss of or damage to property (except the *works*, Plant and 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	Loss of or damage to property *Employer*'s property The replacement cost where not covered by the *Employer*'s insurance The *Employer*'s policy deductible, as Contract Date, where covered by the *Employer*'s insurance Other property The replacement cost Bodily injury to or death of a person The amount required by applicable l
Liability for 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	The amount required by the applicabl law

Z 13.2 **Replace core clause 87 with the following:**
The *Employer* provides the insurances stated in the Insurance Table B.

INSURANCE TABLE B

Insurance against or name of policy	**Minimum amount of cover or minimum l of indemnity**
Assets All Risk	Per the insurance policy document

Contract Works insurance	Per the insurance policy document
Environmental Liability	Per the insurance policy document
General and Public Liability	Per the insurance policy document
Transportation (Marine)	Per the insurance policy document
Motor Fleet and Mobile Plant	Per the insurance policy document
Terrorism	Per the insurance policy document
Cyber Liability	Per the insurance policy document
Nuclear Material Damage and Business Interruption	Per the insurance policy document
Nuclear Material Damage Terrorism	Per the insurance policy document

Z14 Nuclear Liability

Z14.1 The *Employer* is the operator of the Koeberg Nuclear Power Station (KNPS), a nuclear installation, as designated by the National Nuclear Regulator of the Republic of South Africa, and is the holder of a nuclear licence in respect of the KNPS.

Z14.2 The *Employer* is solely responsible for and indemnifies the *Contractor* or any other person against any and all liabilities which the *Contractor* or any person may incur arising out of or resulting from nuclear damage, as defined in Act 47 of 1999, save to the extent that any liabilities are incurred due to the unlawful intent of the *Contractor* or any other person or the presence of the *Contractor* or that person or any property of the *Contractor* or such person at or in the KNPS or on the KNPS site, without the permission of the *Employer* or of a person acting on behalf of the *Employer*.

Z14.3 Subject to clause Z14.4 below, the *Employer* waives all rights of recourse, arising from the aforesaid, save to the extent that any claims arise or liability is incurred due or attributable to the unlawful intent of the *Contractor* or any other person, or the presence of the *Contractor* or that person or any property of the *Contractor* or such person at or in the KNPS or on the KNPS site, without the permission of the *Employer* or of a person acting on behalf of the *Employer*.

Z14.4 The *Employer* does not waive its rights provided for in section 30 (7) of Act 47 of 1999, or any replacement section dealing with the same subject matter.

Z14.5 The protection afforded by the provisions hereof shall be in effect until the KNPS is decommissioned.

Z15 Asbestos

For the purposes of this Z-clause, the following definitions apply:

AAIA means approved asbestos inspection authority.

ACM means asbestos containing materials.

AL means action level, i.e. a level of 50% of the OEL, i.e. 0.1 regulated asbestos fibres per ml of air measured over a 4 hour period. The value at which proactive actions is required in order to control asbestos exposure to prevent exceeding the OEL.

Ambient Air means breathable air in area of work with specific reference to breathing zone,

which is defined to be a virtual area within a radius of approximately 30cm from the nose inlet.

Compliance Monitoring means compliance sampling used to assess whether or not the personal exposure of workers to regulated asbestos fibres is in compliance with the Standard's requirements for safe processing, handling, storing, disposal and phase-out of asbestos and asbestos containing material, equipment and articles.

OEL means occupational exposure limit.

Parallel Measurements means measurements performed in parallel, yet separately, to existing measurements to verify validity of results.

Safe Levels means airborne asbestos exposure levels conforming to the Standard's requirements for safe processing, handling, storing, disposal and phase-out of asbestos and asbestos containing material, equipment and articles.

Standard means the *Employer*'s Asbestos Standard 32-303: Requirements for Safe Processing, Handling, Storing, Disposal and Phase-out of Asbestos and Asbestos Containing Material, Equipment and Articles.

SANAS means the South African National Accreditation System.

TWA means the average exposure, within a given workplace, to airborne asbestos fibres, normalised to the baseline of a 4 hour continuous period, also applicable to short term exposures, i.e. 10-minute TWA.

Z15.1 The *Employer* ensures that the Ambient Air in the area where the *Contractor* will Provide the Services conforms to the acceptable prescribed South African standard for asbestos, as per the regulations published in GNR 155 of 10 February 2002, under the Occupational Health and Safety Act, 1993 (Act 85 of 1993) ("Asbestos Regulations"). The OEL for asbestos is 0.2 regulated asbestos fibres per millilitre of air as a 4-hour TWA, averaged over any continuous period of four hours, and the short term exposure limit of 0.6 regulated asbestos fibres per millilitre of air as a 10-minute TWA, averaged over any 10 minutes, measured in accordance with HSG248 and monitored according to HSG173 and OESSM.

Z15.2 Upon written request by the *Contractor*, the *Employer* certifies that these conditions prevail. All measurements and reporting are effected by an independent, competent, and certified occupational hygiene inspection body, i.e. a SANAS accredited and Department of Employment and Labour approved AAIA. The *Contractor* may perform Parallel Measurements and related control measures at the *Contractor*'s expense. For the purposes of compliance the results generated from Parallel Measurements are evaluated only against South African statutory limits as detailed in clause Z15.1. Control measures conform to the requirements stipulated in the AAIA-approved asbestos work plan.

Z15.3 The *Employer* manages asbestos and ACM according to the Standard.

Z15.4 In the event that any asbestos is identified while Providing the Services, a risk assessment is conducted and if so required, with reference to possible exposure to an airborne concentration of above the AL for asbestos, immediate control measures are implemented and relevant air monitoring conducted in order to declare the area safe.

Z15.5 The *Contractor*'s personnel are entitled to stop working and leave the contaminated area forthwith until such time that the area of concern is declared safe by either Compliance Monitoring or an AAIA approved control measure intervention, for example, per the emergency asbestos work plan, if applicable.

Z15.6 The *Contractor* continues to Provide the Services, without additional control measures presented, on presentation of Safe Levels. The contractually agreed dates to Provide the Services, including the Completion Date, are adjusted accordingly. The contractually agreed dates are extended by the notification periods required by regulations 3 and 21 of the Asbestos Regulations, 2001.

Z15.7 Any removal and disposal of asbestos, asbestos containing materials and waste, is done by a registered asbestos contractor, instructed by the *Employer* at the *Employer*'s expense, and conducted in line with South African legislation.

C1.2 Contract Data

Part two - Data provided by the *Contractor*

.

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:	**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	
B	**Priced contract with bill of quantities**	

11.2(21)	The *bill of quantities* is in			
11.2(31)	The tendered total of the Prices is	**(in figures)** **(in words), excluding VAT**		
B	**Priced contract with bill of quantities**	**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.** **Please insert another schedule if foreign resources may also be used**	**Category of employee**	**Hourly rate**	
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 B

Document reference	Title	No of pages
C2.1	Pricing assumptions: Option B	
C2.2	The *bill of quantities*	

C2.1 Pricing assumptions: Option B

1. How work is priced and assessed for payment

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

Identified and defined terms 11 11.2

(21) The Bill of Quantities is the *bill of quantities* as changed in accordance with this contract to accommodate implemented compensation events and for accepted quotations for acceleration.

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

- the quantity of the work which the *Contractor* has completed for each item in the Bill of Quantities multiplied by the rate and
- a proportion of each lump sum which is the proportion of the work covered by the item which the *Contractor* has completed.

Completed work is work without Defects which would either delay or be covered by immediately following work.

(31) The Prices are the lump sums and the amounts obtained by multiplying the rates by the quantities for the items in the Bill of Quantities.

This confirms that Option B is a re-measurement contract and the bill comprises only items measured using quantities and rates or stated as lump sums. Value related items are not used. Time related items are items measured using rates where the rate is a unit of time.

2. Function of the Bill of Quantities

Clause 55.1 in Option B states, “Information in the Bill of Quantities 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 Bill, 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 Bill of Quantities. The Bill of Quantities is only a pricing document.

3. Guidance before pricing and measuring

Employers preparing tenders or contract documents, and tendering contractors are advised to consult the sections dealing with the bill of quantities in the NEC3 Engineering and Construction Contract Guidance Notes before preparing the *bill of quantities* or before entering rates and lump sums into the *bill*.

There is no general provision in Option B for payment for materials on Site before incorporation into the *works*. If secondary Option X14 Advanced payment has not been used then the tendering contractor may obtain the same effect by inserting appropriate items in the method related charges where the *method of measurement* allows, or alternatively making allowance in the rates of the *bill of quantities* for the financing of Plant and Materials until they are incorporated in the *works.*

When compensation events arise, the default position is that the Bill of Quantities is not used to calculate the cost effect of the event. Defined Cost and the resulting Fee is used and Defined Cost includes all components of cost which the *Contractor* is likely to incur, including so called P & G items. Rates and lump sums from the Bill of Quantities, or from any other source, may be used instead of Defined Cost and the Fee only if the *Contractor* and *Project Manager* agree. If they are unable to agree, then Defined Cost

plus Fee is used.

4. Measurement and payment

4.1. Symbols

The units of measurement described in the Bill of Quantities are metric units abbreviated as follows:

Abbreviation	Unit
%	percent
h	hour
ha	hectare
kg	kilogram
kl	kilolitre
km	kilometre
km-pass	kilometre-pass
kPa	kilopascal
kW	kilowatt
l	litre
m	metre
mm	millimetre
m^2	square metre
m^2-pass	square metre pass
m^3	cubic metre
m^3-km	cubic metre-kilometre
MN	meganewton
MN.m	meganewton-metre
MPa	megapascal
No.	number
sum	Lump sum
t	tonne (1000kg)

4.2. General assumptions

4.2.1. Unless otherwise stated, items are measured net in accordance with the drawings, and no allowance has been made in the quantities for waste.

4.2.2. The Prices and rates stated for each item in the Bill of Quantities shall be treated as being fully inclusive of all work, risks, liabilities, obligations, overheads, profit and everything necessary as incurred or required by the *Contractor* in carrying out or providing that item.

4.2.3. An item against which no Price is entered will be treated as covered by other Prices or rates in the *bill of quantities*.

4.2.4. The quantities contained in the Bill of Quantities may not be final and do not necessarily represent the actual amount of work to be done. The quantities of work assessed and certified for payment by the *Project Manager* at each assessment date will be used for determining payments due.

4.2.5. The short descriptions of the items of payment given in the *bill of quantities* are only for the purposes of identifying the items. Detail regarding the extent of the work entailed under each item is provided in the Works Information.

4.3. Departures from the *method of measurement*

4.3.1.

4.4. Amplification of or assumptions about measurement items

The following is provided to assist in the interpretation of descriptions given in the *method of measurement*. In the event of any ambiguity or inconsistency between the statements in the *method of measurement* and this section, the interpretation given in this section shall be used.

4.4.1.

C2.2 the *bill of quantities*

ITEM NO	DESCRIPTION	UNIT	QTY	DURATION	
	BILL NO 1 **PRELIMINARIES AND GENERAL**				
	FIXED COSTS				
	Site Establishment for: **Delivery of Office Converted Containers**	Once Off	2		
	Site Establishment for: **Delivery of 9m Open Plan Container** (Dining Area)	Once Off	1		
	Site Establishment for: **Delivery of Kitchen Converted Container**	Once Off	1		
	Site Establishment for: **Delivery of Steel Storage Container**	Once Off	1		
	Site De-Establishment for: **Collection of Office Converted Containers**	Once Off	2		
	Site De-Establishment for: **Collection of 9m Open Plan Container**	Once Off	1		
	Site De-Establishment for: **Collection of Kitchen Converted Container**	Once Off	1		
	Site De-Establishment for: **Collection of Steel Storage Container**	Once Off	1		
	Site Establishment for: **Delivery of Hired Plant**	Once Off	1		
	Site Establishment for: **Collection of Hired Plant**	Once Off	1		
	Medicals - Entry	Once Off	44		
	Medicals - Exit	Once Off	44		
	Standard PPE	Once Off	44		
	Safety File	Once Off	1		
	Security Clearance Certification	No	44		
	Delivery and Collection of Portable Flushable Toilets	Once Off	4		
	TIME RELATED COSTS				
	Light Driven Vehicle (2 x 4)	Per Month	1	8	
	Home-Work-Home (22 Seater Bus)	Per Month	2	8	
	3 x 6m Office Converted Containers	Per Month	2	8	
	3 x 9m Open Plan Container	Per Month	1	8	
	3 x 6m Kitchen Converted Container L-6m	Per Month	1	8	
	3.4 x 6m Steel Storage Container L-6m	Per Month	1	8	
	Portable Flushable Toilets with handwash basin (**To be serviced once a week**)	Per Month	2	8	
	Sub-Total for P&Gs:				
	Hired Plant Usage:				
	TLB	Days	84		
	Water tank	Days	84		
	Cherry Picker	Days	84		
	$12m^3$ Tipper Truck	Days	84		
	Rammer	Days	84		
	Crane Truck	Days	84		
	Front End Loader	Days	84		

	Excavator (to include Pecker and Moil, when needed)	Days	42		
	Generator	Days	63		
	Grader	Days	42		
	10 Ton Roller Compactor	Days	42		
	Plate Compactor	Days	42		
	Sub-Total for Hired Plant Usage:				
	RESOURCES				
	Design Crew				
	Electrical Eng (Pr 5-10 Years Exp)	Hours	1	651	
	Civil Eng (Pr 5-10 Years Exp)	Hours	1	651	
	ICT Specialist (5-10 Years Exp)	Hours	1	651	
	Draughtsman (5-9 Years Exp)	Hours	1	651	
	Site Crew				
	Site Manager	Hours	1	1301	
	Site Civil Supervisor (5-10 Years Exp)	Hours	1	1301	
	Site Electrical Supervisor (5-10 Years Exp)	Hours	1	1301	
	Environmental Officer (1-5 Years Exp)	Hours	1	1301	
	Safety Officer (1-5 Years Exp)	Hours	1	1301	
	Quality Officer (1-5 Years Exp)	Hours	1	1301	
	Land Surveyor (1-5 Years Exp)	Hours	1	1301	
	Civil Technician (1-5 Years Exp)	Hours	1	1301	
	General Worker	Hours	12	1301	
	Semi-skilled Labour	Hours	12	1301	
	Plant Operator	Hours	1	1301	
	Concrete hand	Hours	1	1301	
	IT Engineer	Hours	1	325	
	Electrician	Hours	1	651	
	Senior Technician	Hours	2	651	
	Assistant Technician	Hours	2	651	
	Sub-Total for Design and Site Resources:				
	Carried to Final Summary				
	BUILDERS WORK BILL NO 1: PRELIMINARIES AND GENERAL (PROVISIONAL)				

ITEM NO	DESCRIPTION	UNIT	QTY		
	BILL NO 2 **ALTERATIONS**				
	SUPPLEMENTARY PREAMBLES **View site:**				
	Before submitting their tender the contractor shall visit the site and satisfy themselves as to the nature and extent of the work to be done and the value of the materials contained in the buildings or portions of the buildings to be demolished. No claim for any variations of the contract sum in respect of the nature and extent of the work or of inferior or damaged materials will be entertained				
	Old materials to become property of the Contractor:				
	Old materials from alterations, except where desrcibed as to be re-used or handed over, become the property of the Employer				
	REMOVAL OF EXISTING WORK:				
	Carefully take down and removing existing gates, fence, etc. including cutting joints:				
	Diamond razor mesh fencing approximately 1800mm high including poles embedded in concrete	m	955		
	1200 x 1800mm high Mild steel pedestrian gate including all necessary accessories	No	3		
	3500mm wide gate	No	1		
	REMOVAL OF RUBBISH, DISUSED MATERIALS, ETC				
	Removal of rubbish, disused materials, etc				
	Remove from site all rubbish, disused or unwanted materials around the perimeter fence of the building and cart away to an area to be directed by the Site/Project Manager	Item	1		
	Carried to Final Summary				
	BUILDERS WORK BILL NO 2: ALTERATIONS (PROVISIONAL)				

ITEM	DESCRIPTION	UNIT	QTY		

NO						
	BILL NO 3 **EARTHWORKS**					
	SUPPLEMENTARY PREAMBLES **Nature of ground:**					
	The nature of the ground is assumed to be gravel, therefore "earth", but possibly interspersed with "soft rock" or "hard rock"					
	Should the Contractor encounter any "soft" or "hard" rock in the excavations, he shall immediately notfiy the Engineer who shall be the sole arbiter as to what constitutes "soft" or "hard" rock for final account purposes					
	Scanning:					
	Scanning of underground services and utilities shall precede all excavation works	Days	3			
	Site Clearance:					
	Allow for clearing the area of the site to be built upon of grass, weeds, shrubs, debris, etc, including grubbing up all roots, scoffling up as required and cart away all vegetation and debris	m^2	955			
	Strip average 150mm thick layer of topsoil and recompact (measures elsewhere)	m^3	688.50			
	EXCAVATIONS, FILLING, ETC OTHER THAN BULK:					
	Excavation in earth not exceeding 2m deep:					
	Trenches (Anti-Tunneling and Cable Sleeves)	m^3	453.63			
	Holes	m^3	155.73			
	Road Crossing	m^3	25.92			
	Extra over trench and hole excavations in earth for excavation in:					
	Soft rock	m^3	63.53			
	Hard rock	m^3	63.53			
	Extra over all excavations for carting away					

	Surplus material from excavations and/or stock piles on site to a dumping site to be located by the employer	m^3	635.27		
	Keeping excavations free of water				
	Keeping excavations free of all water other than subtrranean water	Item	1		
	EARTH FILLING, ETC.				
	Import G5 material from commercial sources and use to fill, compact to 93% Mod. AASHTO max density:				
	2% Slope from the edge of the building apron slab	m^3	780.30		
	Compaction of surfaces:				
	Compaction of existing ground surface under floors, paving, etc including scarifying for a depth of 150mm, breaking down oversize material, adding suitable material where necessary and compacting to 95% Mod AASHTO density	m^2	4590		
	Earth filling obtained from the excavations and/or prescribed stock piles on site, compacted to 90% Mod AASHTO max density				
	Backfilling to trenches, holes, etc	m^3	196.08		
	Import G10 material from commercial sources and use to fill in 150mm layers, compact to 95% Mod. AASHTO max density:				
	Patrol Access road	m^3	330		
	Import G5 material from commercial sources and use to fill in 150mm layers, compact to 95% Mod. AASHTO max density:				
	Backfilling to trenches, holes, etc	m^3	162.35		
	Import G5 material from commercial sources and use to fill in 60mm layers, compact to 95% Mod. AASHTO max density:				
	Sub-base				
	Construct sub-base with material from commercial source compacted to 95% Mod MAASHTO				

	60mm cut through the road (G5)	m^3	1.728		
	Import G5 material from commercial sources and use to fill in 150mm layers, compact to 90% Mod. AASHTO max density:				
	Sub-base				
	Construct sub-base with material from commercial source compacted to 90% Mod MAASHTO				
	Aggregated surface on top of sub-base (Patrol Access road)	m^2	365.09		
	Import G4 material from commercial sources and use to fill in 60mm layers, compact to 95% Mod. AASHTO max density:				
	Base				
	Construct base with material from commercial source compacted to 95% Mod MAASHTO				
	60mm cut through the road (G4)	m^3	1.728		
	Aggregated Surface				
	32mm gravel filling on top of sub-base	m^2	28.8		
	Compaction of surfaces:				
	Compaction of existing ground surface under floors, paving, etc and compacting to 90% Mod AASHTO density	m^2	2749.5		
	Compaction of existing ground surface under floors, paving, etc for a depth of 100mm, breaking down oversize material, adding suitable material where necessary and compacting to 90% Mod AASHTO density	m^2	4877.5		
	Compaction of existing ground surface under floors, paving, etc for a depth of 260mm, breaking down oversize material, adding suitable material where necessary and compacting to 90% Mod AASHTO density	m^2	83.16		
	Compaction of existing ground surface under floors, paving, etc for a depth of 150mm, breaking down oversize material, adding suitable material where necessary and compacting to 93% Mod AASHTO density	m^2	477.5		
	Compaction of existing ground surface under floors, paving, etc for a depth of 150mm, breaking down oversize material, adding suitable material where necessary and compacting to 95% Mod AASHTO density	m^2	990.09		
	Compaction of existing ground surface under floors, paving, etc for a depth of 60mm, breaking down oversize material, adding suitable material where necessary and compacting to 95% Mod AASHTO density	m^2	1069.2		

	Prescribed density tests on filling:				
	Modified AASHTO Density test	No	100		
	Carried to Trade Summary				
	BUILDERS WORK BILL NO 3: EARTHWORKS (PROVISIONAL)				

ITEM NO	DESCRIPTION	UNIT	QTY		
	BILL NO 4 **CONCRETE, FORMWORK AND REINFORCEMENT**				
	Cost of tests The costs of making, storing and testing of concrete test cubes as required under 7 "Tests" of SABS 1200G shall include the cost of providing cube moulds necessary for the purpose, for testing costs and for submitting reports on the tests to the Engineer. The testing shall be undertaken by an independent firm or institution nominated by the contractor to the approval of the Engineer				
	CONCRETE WORK				
	UNREINFORCED CONCRETE CAST AGAINST EXCAVATED SURFACES				
	50MPa/19mm concrete:				
	Blinding	m^3	1		
	35MPa/19mm concrete:				
	Road crossing	m^3	1.27		
	25MPa/19mm concrete:				
	Bases for Concrete poles	m^3	21.60		
	20MPa/19mm concrete:				
	Holes, etc	m^3	88.19		
	Anti-tunnelling T-Beam	m^3	47.75		

	15MPa/19mm concrete:					
	Bases for Galvanised poles	m^3	2.20			
	ROUGH FORMWORK (DEGREE OF ACCURACY III)					
	Rough formwork to sides:					
	Anti-tunnelling T-Beam	m^2	448.85			
	25mm x 25mm Chamfer to Stub Columns	m	79.20			
	TEST BLOCK					
	Making and testing 150 x 150 x 150mm concrete strength test cube (3 sets/test) and submit report to the Engineer/Employer (only successful tests will be paid for)	Sets	50			
	CONCRETE SUNDRIES					
	30MPa no-shrink grout:					
	Bedding approximately 50mm thick under 240mm x 240mm base plate	No	44			
	REINFORCED CONCRETE CAST AGAINST EXCAVATED SURFACES					
	35MPa/19mm concrete:					
	Bases for Concrete poles and Gates Bases	m^3	3.51			
	ROUGH FORMWORK (DEGREE OF ACCURACY III)					
	Rough formwork to sides:					
	Manhole bases and top cover	m^2	26.40			
	REINFORCEMENT					
	High tensile steel reinforcement to structural concrete work:					

	395 Mesh panel (size: 6.00m x 2.40m x 8mm) to Manhole bases	No	3.00		
	High tensile steel reinforcement to structural concrete work:				
	High tensile steel bar reinforcement (Y16)	t	0.8342		
	High tensile steel bar reinforcement (Y12)	t	1.2190		
	Mild steel bar reinforcement (R10)	t	0.2851		
	Carried to Final Summary				
	BUILDERS WORK BILL NO 4: CONCRETE, FORMWORK AND REINFORCEMENT (PROVISIONAL)				

ITEM NO	DESCRIPTION	UNIT	QTY		
	BILL NO 5 **STRUCTURAL STEEL**				
	Design and construct approximately 20m (width) x 3m (depth) bridge/culvert crossings with all fixations at all stormwater drainage interfce points. All steel members shall be galvanised	No	3		
	Construct and install approximately 22m (length) guardrail system with all fixation along all stormwater crossings along the fence line. Guardrail to comply with the requirements of SANS 1350	m	288		
	Carried to Final Summary				
	BUILDERS WORK BILL NO 5: STRUCTURAL STEEL (PROVISIONAL)				

ITEM NO	DESCRIPTION	UNIT	QTY		
	BILL NO 6 **METALWORK**				
	FENCING				
	SUPPLY, DELIVER and INSTALL: Single Tier Electric Fence which should be freestanding and erected at a minimum of 5m away from the mechanical fence. 3000mm high above ground level fixed to 100mm x 100mm x 3mm Square tubing 3000mm long (strain post) . Strain post will have 2x 3000m long struts one in each direction manufactured from 50mm x 50mm x 2mm Square tubing. Anti-climb system comprising of spike rails bolted along the fence top, coupled with ripper coil to be installed. All material to be galvanised coated. Strain posts to be planted in 20MPa concrete 500mm x 600mm deep all round the perimeter and struts to be planted in 20MPa concrete 500mm x 300mm deep all around the perimeter. Warning signs shall be displayed conspicuously along the length of the electric fence, fence posts and all access points. The minimum sign dimensions shall be 200mm x 100mm and the lettering and symbols shall be in accordance with SANS 60335-2-76	m	955		
	Supply of 3.0m high Strain posts	No	274		
	Supply of 3.0m long Struts posts	No	47		
	SUPPLY, DELIVER and INSTALL: Double Tier Mechanical Fence, 3000mm high above ground level fixed to 40mm x 40mm x 3mm Hot rolled steel angles 3000mm long (Intermediate post). Intermediate post will have 2x 3000m long struts one in each direction manufactured from 40mm x 40mm x 3mm Angles. Anti-climb system comprising of spike rails bolted along the fence top, coupled with ripper coil to be installed. All material to be galvanised coated. Strain posts to be planted in 20MPa concrete 300mm x 300mm deep all round the perimeter. Warning signs shall be displayed conspicuously along the length of the electric fence, fence posts and all access points. The minimum sign dimensions shall be 200mm x 100mm and the lettering and symbols shall be in accordance with SANS 60335-2-76	m	1910		
	Supply of 3.0m Angles	No	319		
	Supply of 3.0m long Struts angles	No	28		
	10m Overall Length of Lockable Double leaf gates, frames to have rectangular hollow sections and joints shall be contnuously welded. The overall height of the gates when fixed shall not be less than the adjacent fencing height. Each gate leaf to have roller wheels and the gate to be fitted with a sliding horizontal locking bar that is secured to a locking plate welded	No	3		
	Supply and install Double Leaf Swing gates where each leaf is approximately 2.15m wide x 3.73m high, incluing posts, barbed wire and need accessories and shall be hot dip galvanised.	No	6		

	Carried to Final Summary				
	BUILDERS WORK BILL NO 6: METALWORK (PROVISIONAL)				

ITEM NO	DESCRIPTION	UNIT	QTY		
	BILL NO 7 **MANHOLES & COVERS, SLEEVES, CONCRETE POLES, etc**				
	Concrete poles				
	7.5m/130 Diameter tip / 2.5kN Spun Concrete Pole. Poles shall be earthed for protection against lightning and should be earthed via 50 x 3mm earth tails or similar	No	15		
	Concrete manhole rings				
	750 x 0.25 Ring manhole	No	15		
	750 x 0.50 Ring manhole	No	15		
	Kabelflex HDPE pipe				
	DN110 (50m roll) with couplings (Remeasurable)	Roll	82		
	110mm Underground PVC Plain 45 Degree Bend	No	15		
	50mm PVC Plain 45 Degree Bend cast in concrete approximately 800mm long	No	88		
	Gloc Lockable Manhole Cover and Frame (SANS 50124 EN124 Class C250) in cover slab				
	Manhole cover + frame with locking key	No	15		
	Carried to Final Summary				
	BUILDERS WORK BILL NO 7: EXTERNAL WORKS, MANHOLES, ROADS, SLEEVES, etc (PROVISIONAL)				

ITEM NO	DESCRIPTION	UNIT	QTY		
	BILL NO 8				

	THERMAL IMAGING SYSTEM (CCTV)					
	Supply PTZ Thermal Camera	No	4			
	Supply Thermal Network Camera (Fixed Thermal)	No	8			
	Supply Fixed IR Camera	No	2			
	Supply CCTV NVMS Platform. Basic 1U server and 512 Camera Licenses (No failover platform)	No	15			
	Supply BASIC MANAGEMENT SERVER (No failover platform and No Integration platform). Dual power, RAID 1, Intel Xeon E-2336 2.9GHz, 16GB UDIMM, 3200MT/s, ECC, 2x 300GB 10K RPM SAS 12GBPS 512N 2.5IN HOT- PLUG HARD, 1x 2.4TB 10K RPM SAS 12GBPS 512E 2.5IN HOT-PLUG HARD2.4TB 10K RPM SAS 12GBPS 512E 2.5IN HOT-PLUG HARD Microsoft_WS_Standard_2019_16 cores_2VMs. 3Y Basic Onsite To 3Y ProSupport	No	1			
	Supply Dedicated Video data Storage Solution. 3U Bays, RAID 5 Configuration with Parity rebuild and Spare drives. Total 128TB (Usable 112TB on RAID 5). 30 Day storage @ nominal frame and quality standards, based on 70% daily motion principles of detection per 24 hours	No	1			
	Supply 42U CABINET. 1Meter deep, Including blanking plates, cable entry and management	No	1			
	Supply Clearline Surge Protected 6way Power distribution units	No	2			
	Supply Hisense “46” HD Digital Signage Panel. Narrow Bezel. 24/7 operation	No	2			
	Supply Video Wall Brackets (specific for video walls) and cabling	No	2			
	Supply Video Wall HDMI decoders. H264/H265 / 4K/1080P	No	1			
	Supply Processor: Intel Core i7-12700 (25M Cache, up to 4.9 GHz) Memory: 16GB (2x8GB) 4400MHz DDR5 4 DIMM slots (dual channel) Up to 128GB or up to 3200MHz Non-ECC & ECC DDR4 Memory Hard Drive: M.2 2280 512GB NVM gen4 Class 40 Optical Drive: 8x DVD ROM Graphics: GeForce RTX 3070 Ti 8GB GDDR6X DX12 Graphics Card. Keyboard: KB216 Multimedia USB Keyboard Mouse: Optical Mouse Operating System: Windows 11 Professional (64Bit) + DELL MONITOR P2722H 27 INCH	No	2			
	Supply PTZ CAMERA Keyboard	No	2			
	Supply Ergonomic designed Control room furniture. 2 to 3 operator desk, cable management and seating	Sum	1			
	Supply and Installation surface cable hardware. Inclusice of Bosal steel conduits, clamps, PVC trunking, power skirting etc)	Sum	1			

	Supply RM-300X D00 - Remote Microphone for VX-3000 Series	No	1			
	Supply IP Horn Maximum sound pressure level is 124dB at 15W powered with POE+	No	15			
	Supply and install and splice 6 core Single mode fiber cable	m	1000			
	Supply and install 5.6m Galvanised steel stepped pole with access opening cover plate to have 250mm x 250mm base plate	No	44			
	Supply and install 50 x 3 Flat Copper fastened to H.D Bolts with 2 Nuts and 2 Washers (450mm width)	No	12			
	Supply and install 4 x M20 Rods approximately 700mm long, 16 x M20 Nuts and 12 x Washers per stub column to receive galvanised pole	No	44			
	Supply Fiber patch panels	No	15			
	Supply and install 465 x 145mm Inspection Boxes (Junction Boxes) mounted on concrete poles	No	15			
	Networking Hardware Per Pole and Head end equipment (Field Hardened PoE switches, media converters, SFP modules, rack/s)	No	15			
	Supply and install Power Reticulation with CoC for poles and head end equipment (power cabling, power points, surge protection, Power cable installation and termination certification)	No	15			
	Supply and install Network CAT6e Cabling, termination per pole and head end equipment	No	15			
	3-Phase 400V 100A IP65 DB Box	No	4			
	DB Support Brackets	No	4			
	60W LED High performance Luminaire including fixation	No	44			
	4mm2/4C/PCV/SWA/PVC Power supply cables	m	1200			
	16mm2/4C/PCV/SWA/PVC Power supply cables	m	1200			
	Cable termination	Sum	1			
	Commissioning, Testing, Integration and handover of the whole system with As Built drawings and Manuals	Days	5			
	Conduit Mandrel Test					

	The contractor to conduct a mandrel test on the conduit pipes after installation is complete	Days	3		
	Plant labelling				
	Anodised Aluminium tags - Label Type GA	No	103		
	Carried to Final Summary				
	BUILDERS WORK BILL NO 8: THERMAL IMAGING SYSTEM (CCTV) (PROVISIONAL)				

SUMMARY

BILL 1	PRELIMINARIES & GENERAL
BILL 2	ALTERATIONS
BILL 3	EARTHWORKS
BILL 4	CONCRETE, FORMWORK AND REINFORCEMENT
BILL 5	STRUCTURAL STEEL
BILL 6	METALWORK
BILL 7	EXTERNAL WORKS, MANHOLES, ROADS, SLEEVES, etc
BILL 8	THERMAL IMAGING SYSTEM (CCTV)
	TOTAL AMOUNT (EXCL VAT)

PART 3: SCOPE OF WORK

Document reference	Title	No of pages
	This cover page	1
C3.1	*Employer*'s Works Information	2-51
C3.2	*Contractor*'s Works Information	52
	Total number of pages	52

C3.1: EMPLOYER'S WORKS INFORMATION

Contents

Part 3: Scope of Work 1
C3.1: Employer's works Information 2
1 Description of the *works* 5
2 Management and start up. 54
2.1 Management meetings 54
2.2 Documentation control 54
2.3 Health and safety risk management 55
2.4 Environmental constraints and management 55
2.5 Quality assurance requirements 55
2.6 Programming constraints 56
2.7 *Contractor*'s management, supervision and key people 56
2.8 Invoicing and payment 56
2.9 Insurance provided by the *Employer* 57
2.10 Contract change management 57
2.11 Provision of bonds and guarantees 57
2.12 Records of Defined Cost, payments & assessments of compensation events to be kept by the *Contractor* 57
2.13 Training workshops and technology transfer 57
3 Engineering and the *Contractor*'s design 58
3.1 *Employer*'s design 58
3.2 Parts of the *works* which the *Contractor* is to design 58
3.3 Procedure for submission and acceptance of *Contractor*'s design 58
3.4 Other requirements of the *Contractor*'s design 58
3.5 Use of *Contractor*'s design 58
3.6 Design of Equipment 58
3.7 Equipment required to be included in the *works* 58
3.8 As-built drawings, operating manuals and maintenance schedules 58
4 Procurement 59
4.1 People 59
4.1.1 Minimum requirements of people employed on the Site 59
4.1.2 BBBEE and preferencing scheme 59
4.1.3 Accelerated Shared Growth Initiative – South Africa (ASGI-SA) 59
4.2 Subcontracting 59
4.2.1 Preferred subcontractors 59

4.2.2 Subcontract documentation, and assessment of subcontract tenders ... 59
4.2.3 Limitations on subcontracting ... 59
4.2.4 Attendance on subcontractors ... 59
4.3 Plant and Materials ... 59
4.3.1 Quality ... 59
4.3.2 Plant & Materials provided “free issue” by the *Employer* ... 59
4.3.3 *Contractor*’s procurement of Plant and Materials ... 60
4.3.4 Spares and consumables ... 60
4.4 Tests and inspections before delivery ... 60
4.5 Marking Plant and Materials outside the Working Areas ... 60
4.6 *Contractor*’s Equipment (including temporary works). ... 60
4.7 Cataloguing requirements by the *Contractor* ... 60
5 Construction ... 60
5.1 Temporary works, Site services & construction constraints ... 60
5.1.1 *Employer*’s Site entry and security control, permits, and Site regulations ... 60
5.1.2 Restrictions to access on Site, roads, walkways and barricades ... 61
5.1.3 People restrictions on Site; hours of work, conduct and records ... 61
5.1.4 Health and safety facilities on Site ... 61
5.1.5 Environmental controls, fauna & flora, dealing with objects of historical interest ... 61
5.1.6 Title to materials from demolition and excavation ... 61
5.1.7 Cooperating with and obtaining acceptance of Others ... 61
5.1.8 Publicity and progress photographs ... 61
5.1.9 *Contractor*’s Equipment ... 61
5.1.10 Equipment provided by the *Employer* ... 61
5.1.11 Site services and facilities ... 61
5.1.12 Facilities provided by the *Contractor* ... 62
5.1.13 Existing premises, inspection of adjoining properties and checking work of Others ... 62
5.1.14 Survey control and setting out of the *works* ... 62
5.1.15 Excavations and associated water control ... 62
5.1.16 Underground services, other existing services, cable and pipe trenches and covers ... 62
5.1.17 Control of noise, dust, water and waste ... 62
5.1.18 Sequences of construction or installation ... 62
5.1.19 Giving notice of work to be covered up ... 62
5.1.20 Hook ups to existing works ... 62
5.2 Completion, testing, commissioning and correction of Defects ... 63
5.2.1 Work to be done by the Completion Date ... 63
5.2.2 Use of the *works* before Completion has been certified ... 63
5.2.3 Materials facilities and samples for tests and inspections ... 63
5.2.4 Commissioning ... 63
5.2.5 Start-up procedures required to put the *works* into operation ... 63

5.2.6 Take over procedures 63
5.2.7 Access given by the *Employer* for correction of Defects 63
5.2.8 Performance tests after Completion 63
5.2.9 Training and technology transfer 63
5.2.10 Operational maintenance after Completion 63
6 Plant and Materials standards and workmanship 64
6.1 Investigation, survey and Site clearance 64
6.2 Building works 64
6.3 Civil engineering and structural works 64
6.4 Electrical & mechanical engineering works 64
6.5 Process control and IT works 64
6.6 Other [as required] 64
7 List of drawings 65
7.1 Drawings issued by the *Employer* 65
C3.2 *Contractor*'s Works Information 73

1 Description of the *works*

Introduction

The existing Kusile Power Station perimeter fence system needs to be modified. The fence system configuration consists of mechanical and electric fencing, perimeter lighting, Closed Circuit Television (CCTV), a Public Address (PA) and road infrastructure. The project scope includes the provision of engineering designs, procurement and construction services including commissioning of the works.

Supporting Clauses

a) Scope

1) Purpose

The purpose of this document is to outline the project specifications for the intended *Works* at Kusile Power Station.

2) Applicability

This document shall to Kusile power Station

3) Effective date

This document shall be effective from the date of its authorization.

b) Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

Normative

[1] KUS-202211157: Kusile Power Station Refurbishment of the ex-GE Store Concept Design Report

Table 1: *Employer* Standards

Code	Description
Applicable Standards	
240-4332798	Engineering policy
240-5311685	Design Review Procedure
240-53114026	Engineering Change Management Procedure
240-71432150	Plant Labelling Standard

Code	Description
Applicable Standards	
240-93576498	Coding Standard
240-76992014	Project/Plant Specific Technical Document and Records Management Work Instruction
240-65459834	Gx Projects Documentation Deliverable Requirements Specification
240-57127953	Execution of Site Preparation and Earthworks Standard
240-57127955	Geotechnical and Foundation Engineering Standard
240-107981296 240-56364545	Constructability Assessment Guideline Standard Structural Design and Engineering Standard
203-770	Kusile Specification for Structural Concrete
240-86973501	Engineering drawing Standard
240-66920003	Documentation Management Review and Handover Procedure for Gx Coal Projects
203-103437	Technical Document Submission and Review Work Instruction
203-770	Kusile Power station specification for structural concrete
240-55714363	Coal Fired Power Stations Lighting and small power installation standard
240-93576498	KKS Coding Standard
240-56227443	Requirements for Control and Power Cables for Power Stations Standard
240-56356396	Earthing and Lightning Protection Standard
240-55714363	Coal Fired Power Stations Lighting and small power installation standard
BS EN 62676-4	Video Surveillance Systems for use in Security Applications
240-91190304 -	Specification for CCTV Surveillance with Intruder Detection
SANS 10222-5	Electrical Security Installations Part 5: CCTV installations
240-102220945	Specification for Integrated Access Control System (IACS) for Eskom sites
240-86738968	Specification for Integrated Security Alarm System for Protection of Eskom Install and Subsidiaries
240-55410927	Cyber Security Standard for Operational Technology
240-78980848	Specification for Non-Lethal Energized Perimeter Detection System (NLEPDS) for Protection of Eskom Installations and its Subsidiaries

240-64720986	Emergency Preparedness Public Address System – For Large Area Deployment
240-131050729	Hybrid Coding Standard
240-109607732	Eskom Plant labelling Abbreviation Standard
240-106365693	Standard for the External Corrosion Protection of Plant, Equipmentand Associated Piping with Coatings

Informative

[33] 36-681: Eskom Plant Safety Regulations

[34] 474-58 (Rev1): Document and Records Management

[35] 240-105658000: Supplier Quality Management Specification

Description of the *works*

Executive Overview

A robust perimeter protection solution is required for the Kusile Power Station warehouse facility to ensure continuous monitoring and alarming of the area. The facility is required to be enclosed within the National Key Point fence bounds to maintain an acceptable level of security in the area. The facility covers an area of approximately 66000m^2 including peripheral infrastructure (see Figure 1).

Eskom intends to appoint an external *Contractor* to perform engineering design services, construct and commission the proposed *works*. The *Contractor* reviews existing design data prepared by others, that interface or may impact his designs, for purposes of delivering sound designs. The appointed *Contractor* reviews existing designs for completeness and constructability and proposes value-adding design changes, where required. In addition, the *Contractor* performs technical oversight/supervision during construction and commissioning activities to ensure compliance with designs. The *Contractor* assumes design liability for his designs and issues Certifications of Compliance for their portion of the *Works*.

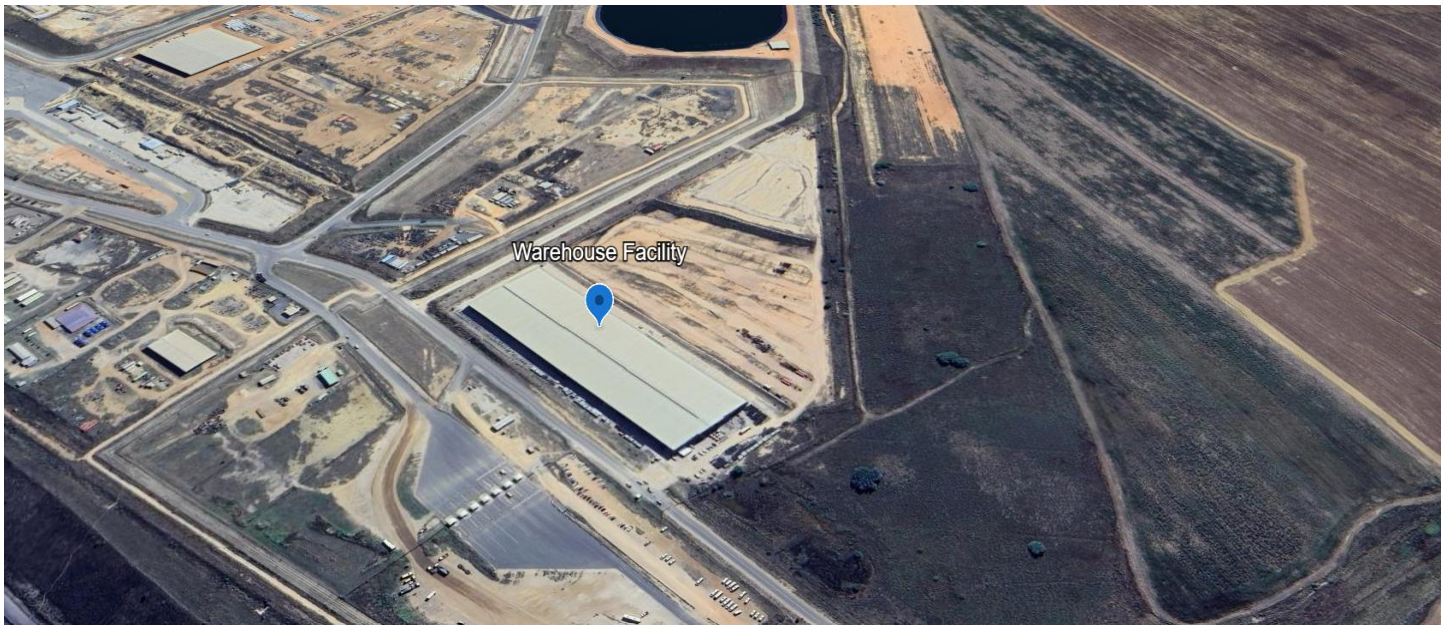


Figure 1: Warehouse Aerial View

Employer's objectives and purpose of the *works*

The proposed perimeter protection works will act to safeguard the restricted area.

Interpretation and terminology

Abbreviations

Abbreviation	Description
CBMS	Consolidated Building Management System
CCTV	Closed Circuit Television
CoC	Certificate of Completion
C&I	Control and Instrumentation
ECSA	Engineering Council of South Africa
HVAC	Heating, Ventilation and Air-conditioning
ITP	Inspection and Test Plan
NKP	National Key Point
OHS Act	Occupational Health and Safety Act
O&M	Operating and Maintenance
PEC	Professional Engineering Certificate
QA	Quality Assurance
QC	Quality Control
QCP	Quality Control Plan
uPVC	Unplasticized Poly Vinyl Chloride
SANS	South African National Standards

Roles and Responsibilities

Contractor

a) Completes the *Works* as outlined in this works information and service agreement
b) Ensures compliance with all requirements of the Occupational Health and Safety Act no 85 of 1993 and its regulations.
c) Takes full professional accountability and liability for all temporary and permanent *Works*
d) The *Contractor* is responsible to issue Professional Engineering Certificates and/or Certificates of Completion for the *Works*
e) Ensures all employees are medically, physical and psychologically fit to perform the *Works*.
f) Ensures all employees undergo the relevant training as per their function requirement.
g) Ensures compliance with Eskom's SHE policy, procedures, standards, guidelines, specifications and site regulations.
h) Ensures employees have a valid medical certificate of fitness specific to the work to be performed.
i) Ensures employees are informed of hazards identified in the risk assessment before commencement of *Works*. The Method Statement shall also be communicated to the employees before commencement of Works.

j) Ensures that all safety and health related incidents around site or working areas and threats that pose a danger to one's life or health are reported immediately.

k) Ensures sufficient health and safety information as well as resources are made available.

l) Ensures that all employees undergo safety induction on-site.

m) Ensures that all power tools are inspected as and when required.

n) Ensures that prescribed PPE for the specified works are worn at all times. The provision of PPE shall be the responsibility of the *Contractor*.

o) Ensures that correct site drawings are obtained and communicated to the employees undertaking the *Works*.

p) Provides adequate resources for the required *Works*

q) Manages costs and the scheduled time frame for the *Works*

r) Provides regular feedback on the status of the *Works* as requested

Employer

a) Provides engineering support and information relevant to the scope of *works*

b) Reviews and accepts the *Contractor's* design documentation, method statement procedure, QCP and ITP.

c) Is present for all applicable points of the ITP and commissioning activities, where required.

Site Description

The Kusile Power Station site is located approximately 37km northwest of eMalahleni in the Mpumalanga Province. The site is accessed from the R686 road between highways, N4 and N12. The site has approximate coordinates 25° 55' 07.34''S and 28° 54' 43.30''E.

The location of the warehouse facility is given in Figure 1. The facility serves as the main storage area for material stock at the site.

Figure 2: Warehouse Location

General Scope of the *Works*

- The scope of the entire *Works* includes the design, procurement, manufacture, fabrication, factory testing, supply, storage, delivery to site, construction, installation, erection, quality assurance, site testing and commissioning of the detailed *Works*. The construction works include the removal of ~700m of razor mesh fencing and preparation of the site along the fencing line fence. The detailed technical project requirements are specified under section 3.6.
- Double tier mechanical fencing and gates
- Single tier electric fencing and gates
- Bridge or culvert crossings
- Perimeter lighting
- Perimeter Closed Circuit Television (CCTV)
- Perimeter Public Address (PA) system
- Patrol road and associated drainage
- Stormwater design
- Plant labelling

PERIMETER PROTECTION DESIGN

Infrastructure Routing

The proposed routing for the perimeter protection infrastructure is indicated in Figure 3. The *Contractor* evaluates the suitability of the proposed fence routing. The *Contractor* identifies an alternative route for the project *Works,* if deemed necessary.

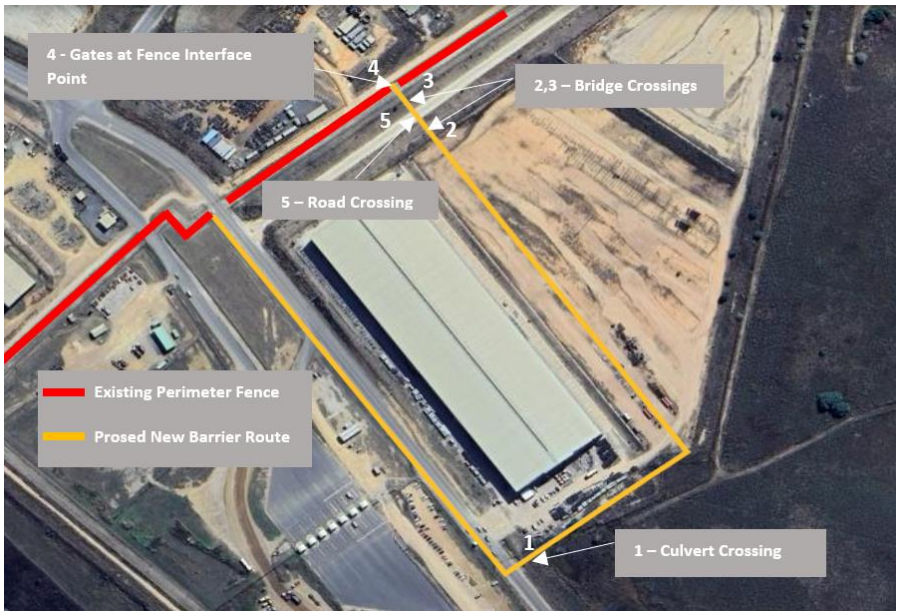


Figure 3: Proposed Routing for Perimeter Security Infrastructure

Geotechnical Investigation

The *Contactor* conducts a geotechnical investigation of the project site to confirm the soil conditions

in the area, for his design. The extent and location of the proposed investigation is highlighted in Figure4. All geotechnical investigations shall be conducted in compliance with the latest national and/or international standards for site investigation and ground classification techniques (this includes sample acquisition and laboratory testing).

The investigations to be carried out may include the following but not limited to:

- Test pit excavations, sampling and profiling
- Dynamic Cone Penetrometer (DCP) tests
- Dynamic Probe Super Heavy (DPSH) test

Figure 4: Proposed Area for Geotechnical Investigation

Security Fencing

Mechanical Fence Design

a) The *Contractor* reviews the existing mechanical fence designs for completeness and proposes design changes and additions where necessary to achieve complete and sound designs.

b) The *Contractor* constructs a double tier mechanical fence system in accordance with the listed drawing details (see Figure 5 for the general fence arrangement). An estimated 955m coverage is required for the facility area. The *Contractor* notes that the fence co-ordinates will be verified on site by the *Contractor* and *Employer*.

c) The fence design is to comply with the listed employer drawings:

- 0.90/707 - P146838-0UYX-S3916A Rev. 2 – Security Fence – Post Concrete Bases and Gate Details
- 0.90/708 - P146838-0UYX-S3916B – Security Fence
- 0.90/709 - P146838-0UYX-S3916C – Security Fence
- 0.90/710 - P146838-0UYX-S3916D – Security Fence
- 0.90/711 - P146838-0UYX-S3916E – Security Fence
- 0.90/712 - P146838-0UYX-S3916F – Security Fence
- 0.90/59093 – P146838-0UYX-S3916G – Security Fence, Single Swing Access Gate, Plan, Elevations and Details
- 0.90/59094 - P146838-0UYX-S3916H – Security Fence
- 0.90/59093 – P146838-0UYX-S3916G – Security Fence, Single Swing Gate Keep Details

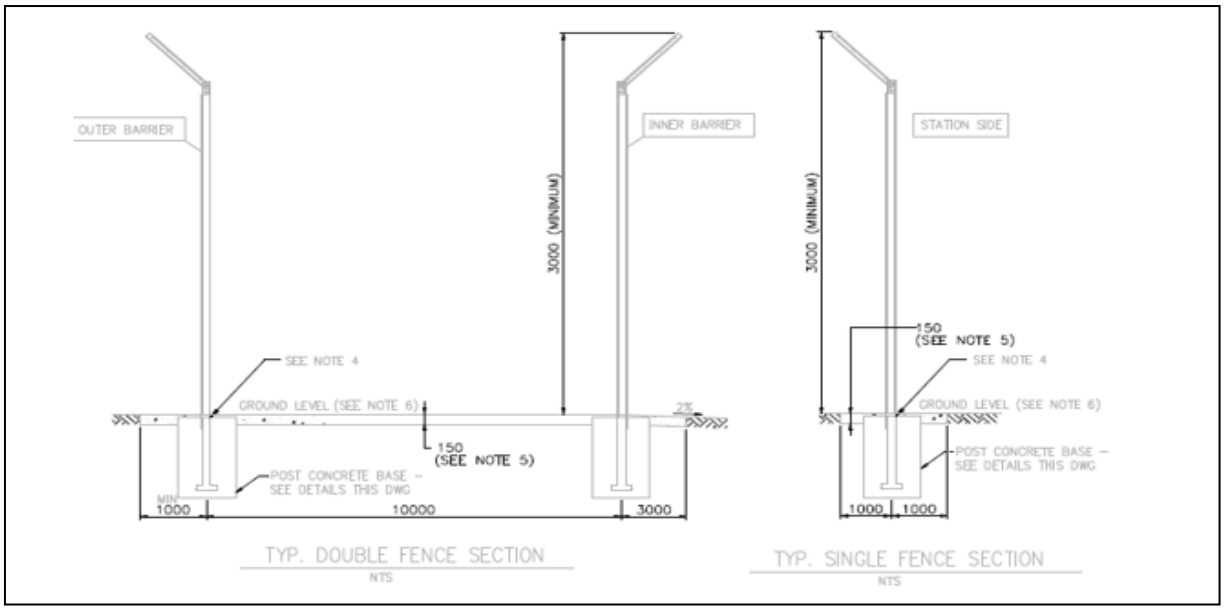


Figure 5: General Arrangement – Mechanical Fencing

Gate Specifications (Mechanical Fence)

a) The *Contractor* reviews the existing mechanical gate designs for completeness and proposes design changes and additions where necessary to achieve complete and sound designs

b) The *Contractor* installs 8-off single swing gates at **Positions 4 and 5 (see Figure 3),** where the new and existing fence interface and at the road crossing. Table 2 indicates the proposed gate design. The gate arrangement where the existing and new fence installation interfaces is indicated in Figure 6 below.

c) The gate designs comply with the listed employer drawings:

- 0.90/59093 – 146838 – 0UYX – S3916G – Security Fence Single Swing Access Gate Plan, Elevations and Details
- 0.90/59094 – 146838 – 0UYX – S3916H – Security Fence Gate Post Foundations
- 0.90/59095 – 146838 – 0UYX – S3916J – Security Fence Single Swing Gate Keep Details

Table 2: Gate Details (Refer to drawing: 0.90/59093)

A (mm)	**B (mm)**	**Foundation type (P146838-0UYX-S3916H)**	**T.O.C Foundation**
4950	4630	1A/1B/1C/1D	100 mm above ground level (max)

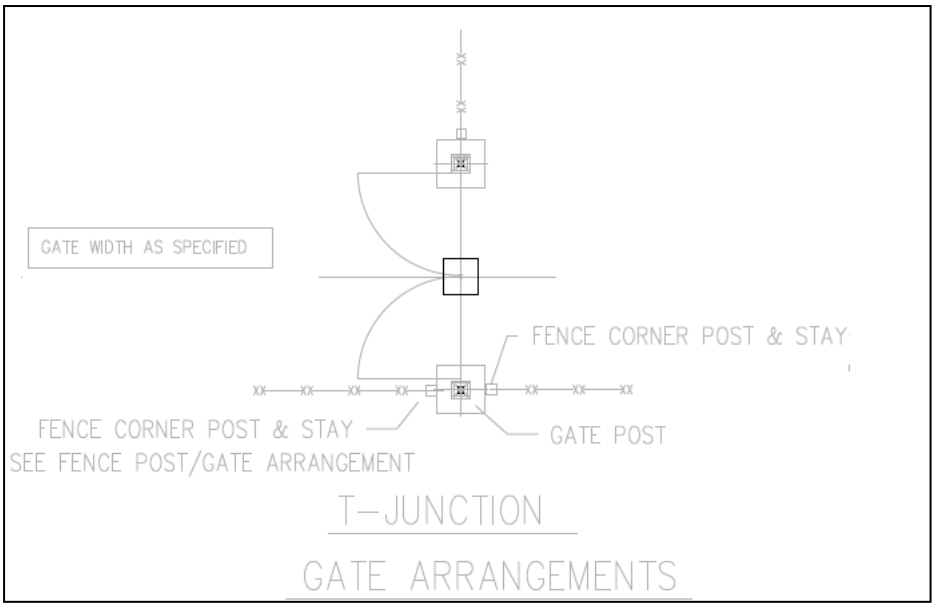


Figure 6: Gate Arrangement at Fence Junction

Culvert/Bridge Crossings (at Drain Points)

a) The *Contractor* to design and construct 3-off bridge/culvert crossings at all stormwater drainage interface points i.e., Positions 1, 2 and 3 per Figure 3 layout drawing. Ditch 1 & 2 are approximately 20m (width) x 3m (depth) - refer to the listed drawings for tyipical details of the existing station bridge crossings. The *Contractor* secures all drain points that interface with the perimeter fence with security grids (see 0.90/25015 & Figure 5 for typical details)). All steel members shall be galvanized.

b) The Contractor to construct and install 4-off guardrail systems along the fence lines to restrain and guide out-of-control vehicles. The approximate length of the rail systems to be 22m. Refer to drawing 0.90/71779 for typical details. Guardrails to comply with the requirements of SANS 1350.

- 0.90/23491 – 146838-0UZJ-S5882 – Fence Bridge – Foundations Plans, Sections & Details, Fence Bridge 1
- 0.90/24999 - 146838-0UZJ – S55884 – Fence Bridge – Foundations Plans, Sections & Details, Fence Bridge 2
- 0.90/25015 – 146838-0UZJ-S5885 – Fence Bridge – Foundations Plans, Sections & Details, Fence Bridge 2
- 0.90/71779 – 146838 – 0GUA – S3573 – Site Finishing – Site Guardrail Details

Figure 7: Security Grid Arrangement (Culvert/Bridge Crossing)

Electric Fence Design

c) The *Contractor* reviews the existing electric fence design for completeness and proposes design changes and additions where necessary, to achieve complete and sound designs

d) The *Contractor* constructs an approximately 955m electric fence between the mechanical fence system. The fence system to be freestanding and erected at a minimum of five metres (5m) away from the mechanical fencing. The fencing design shall align to the existing electric fence system design. The fencing design to adhere to SANS 10222-3:2003, Occupational Health and Safety Act (85 of 1993) and Standard - 240-78980848 [Specification for Non-Lethal Energized Perimeter Detection System (NLEPDS) for Protection of Eskom Installations and its Subsidiaries].

Strain Posts (In-line and Corner)

- Strain posts will be manufactured from 100mm x 100mm x 3mm square tubing, 3000mm long with 2 (two) strut brackets welded in position to accept the strut fixings.
- Strain posts will have twenty-four (24) holes in each side, 100mm apart to accept the strain insulators, and have installed non-metallic tensioner for each wire in one direction.
- Strain posts will have two (2) struts, one in each direction, manufactured from 50mm x 50mm x 2mm square tubing 3000mm long.
- Each strut will have a hole at one end to allow for fixing to the strain post.
- Strain posts and struts will be hot-dip galvanized and fitted complete with twenty four (24) strain insulators, twenty four (24) non-metallic tensioners, and two (2) x M10x25 galvanized bolts, nuts and washers.
- Strain posts will have 500mm x 500mm x 600mm deep, 20MPA concrete foundations.
- Struts will have 500mm x 500mm x 300mm deep, 20MPA concrete foundations .
- Maximum distance between (2) two consecutive strain posts will not exceed 80m.

Intermediate posts

- The intermediate posts will be manufactured from 40mm x 40mm x 3mm hot rolled steel angles

  3000mm long. Steel sections to be hot dip galvanized in accordance with SANS 121.
- The intermediate posts have twenty-four (24) hols on one flange, 100mm apart to accept the intermediate insulators.
- Intermediate posts have a 300mm x 300mm x 300mm deep 20MPA concrete foundation.
- The maximum distance between two (2) consecutive intermediate posts will not exceed 3m.
- All openings that will lead to water entrapment to be sealed appropriately.

Gate Specifications (Electric Fence)

a) The *Contractor* reviews the existing electric gate designs [PGE- 0000-0000-SAG1-GA-001] for completeness and proposes design changes and additions where necessary, to achieve a complete and sound design

b) The *Contractor* installs 2-off single leaf gate at the new and existing fence interface and at the road crossing [**Position 1 & 3**]. Gate lengths are approximately 10m. Gates to be on wheel tracks. See drawing PGE- 0000-0000-SAG1-GA-001, Sheets 1,2 for typical details.

Concrete Anti-tunnelling Beam & Vegetation Control Concrete Slab

The *Contractor* constructs a 20Mpa concrete anti-tunnelling T beam, 100mm (wide) x 500mm (deep), underneath the full length of the electric fence, to prevent unauthorized entries by under burrowing (see Figure 8a and drawing: KUS000-09 – Kusile NLPEF Post and Concrete Slab Installation).

A vegetation control concrete slab is required for the electric fence to prevent vegetation overgrowth and the triggering of false alarms. The control slab to be a minimum of 20Mpa concrete grade. The slab panel sizes to be 800mm (width) x 5000mm (length) x 75mm (thick) at 150mm c/c. All joints to be butted. 800mm x 150mm x 10mm wide soft board expansion joints to be provided at maximum 5m c/c (see Figure 8b and drawing: KUS000-09 – Kusile NLPEF Post and Concrete Slab Installation).

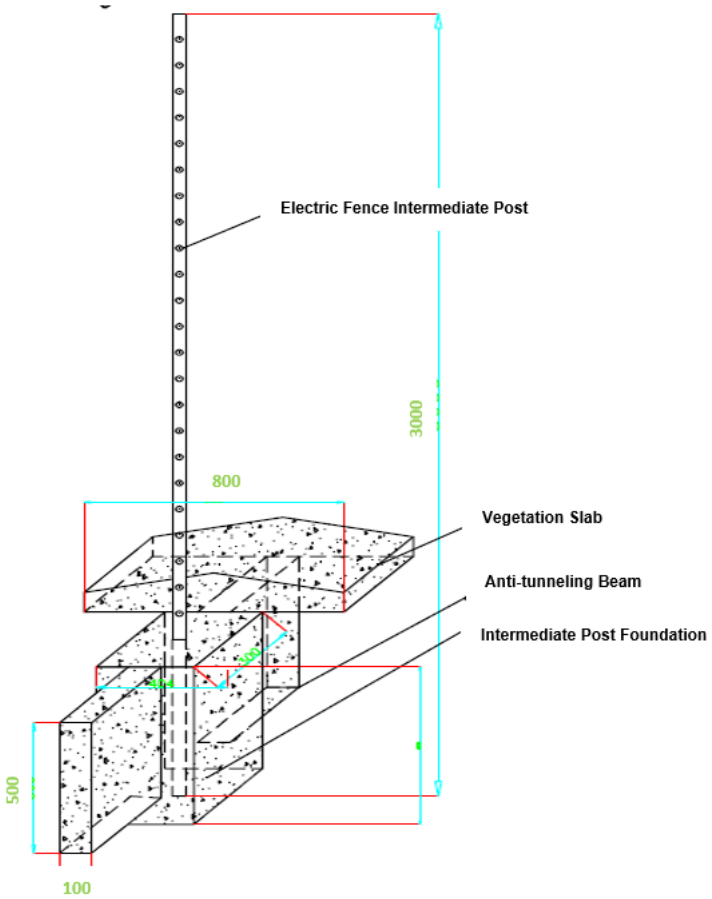


Figure 8a: Vegetation Slab and Anti-tunnelling Beam General Arrangement

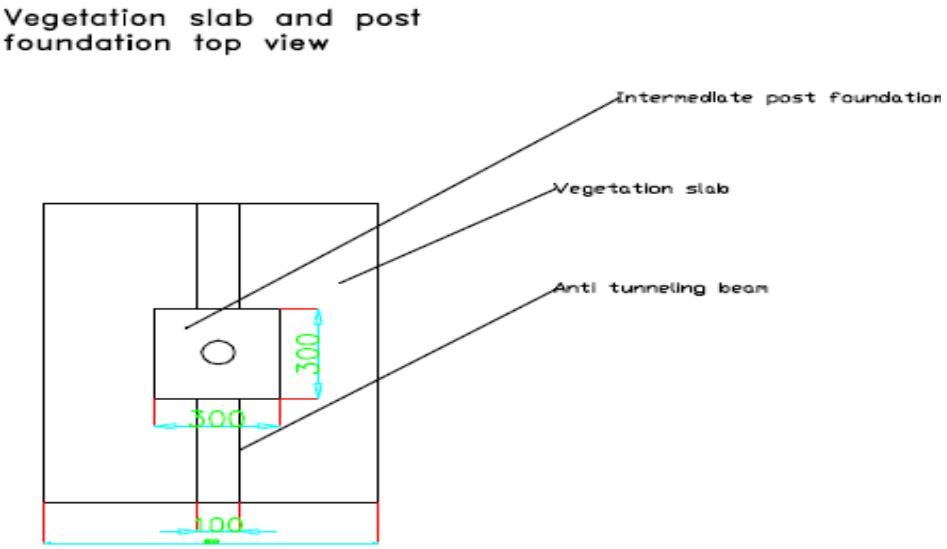


Figure 8b: Vegetation Slab and Anti-tunnelling Beam Plan Layout

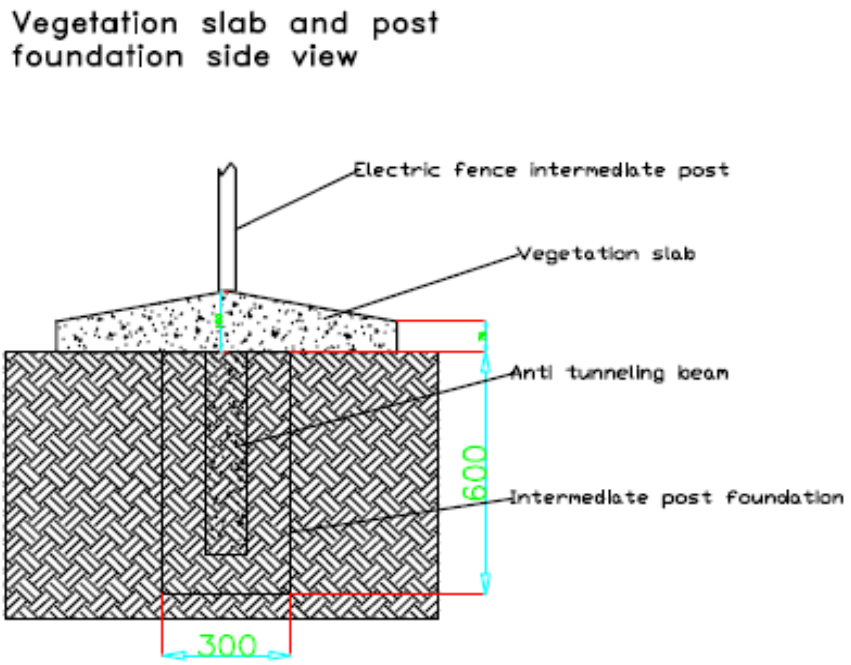


Figure 8c: Vegetation Slab and Anti-tunnelling Beam Elevation Detail

Warning signage

Warning signage shall be displayed conspicuously along the length of the electric fence, fence posts and all access points. The minimum warning sign dimensions shall be 200mm x 100mm and the lettering and symbols shall be in accordance with SANS 60335-2-76.

Patrol Road

b) The *Contractor* to design and construct a continuous patrol route along the length of the perimeter fence including associated stormwater drain designs. The road must lie on the inside boundary of the site/fence system. See figure 9 for the existing pavement layer design. The road length is approximately 550m.

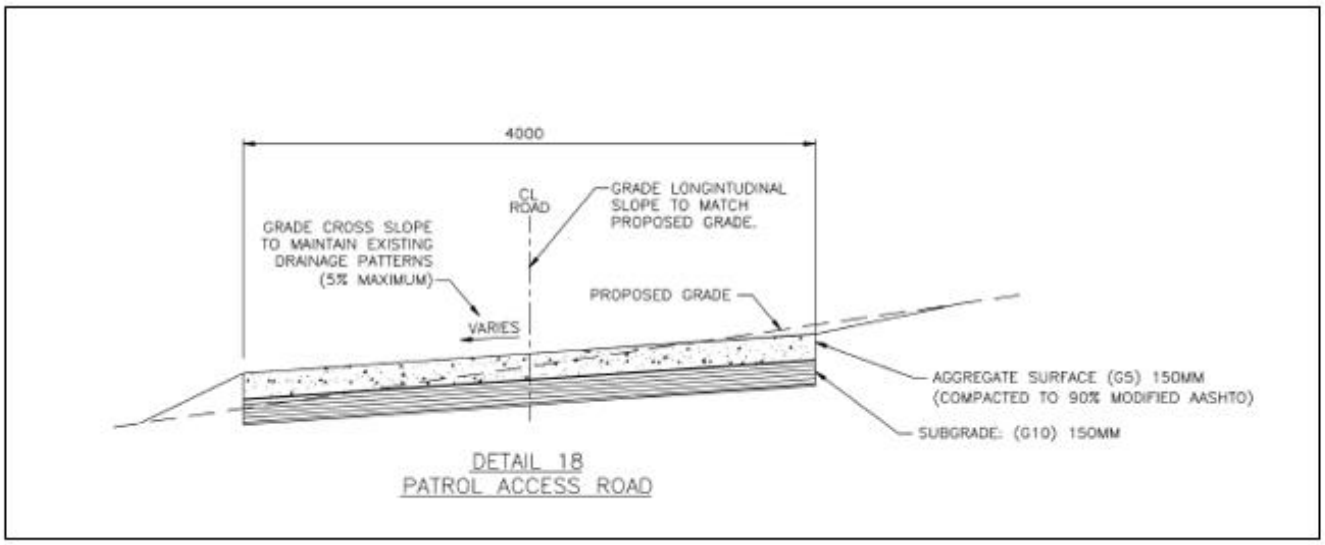


Figure 9: Typical Road Section

- **Perimeter CCTV Civil Infrastructure**

Precast Concrete Poles (Security & Monitoring Application)

The *Contractor* to supply and install precast concrete poles that are suitable for mounting surveillance cameras - see Figure 11 for typical details. The poles shall be adequately designed to resist an Ultimate Load of at least 2.5kN. The pole design shall allow for a cable entry box and an inspection box/opening. The cable entry and inspection boxes to be galvanized steel. The dimensions of the boxes to be 465mm x 145 mm. The poles to be encased in concrete mass fill. Poles shall also be earthed for protection against lightning. Poles shall be earthed via 50 x 3 mm earth tails. The earth tails shall be buried and welded to the base of the fence so as not to be easily visible. Joints shall be painted the same colour as the fence to avoid theft of the copper earthing. The earthing shall conform to the latest revision of the 240-56356396 Earthing and lightning Protection Standard. All pole openings shall be sealed with a suitable sealant. The concrete poles shall adhere to all requirements and specifications as set out in SANS 470.

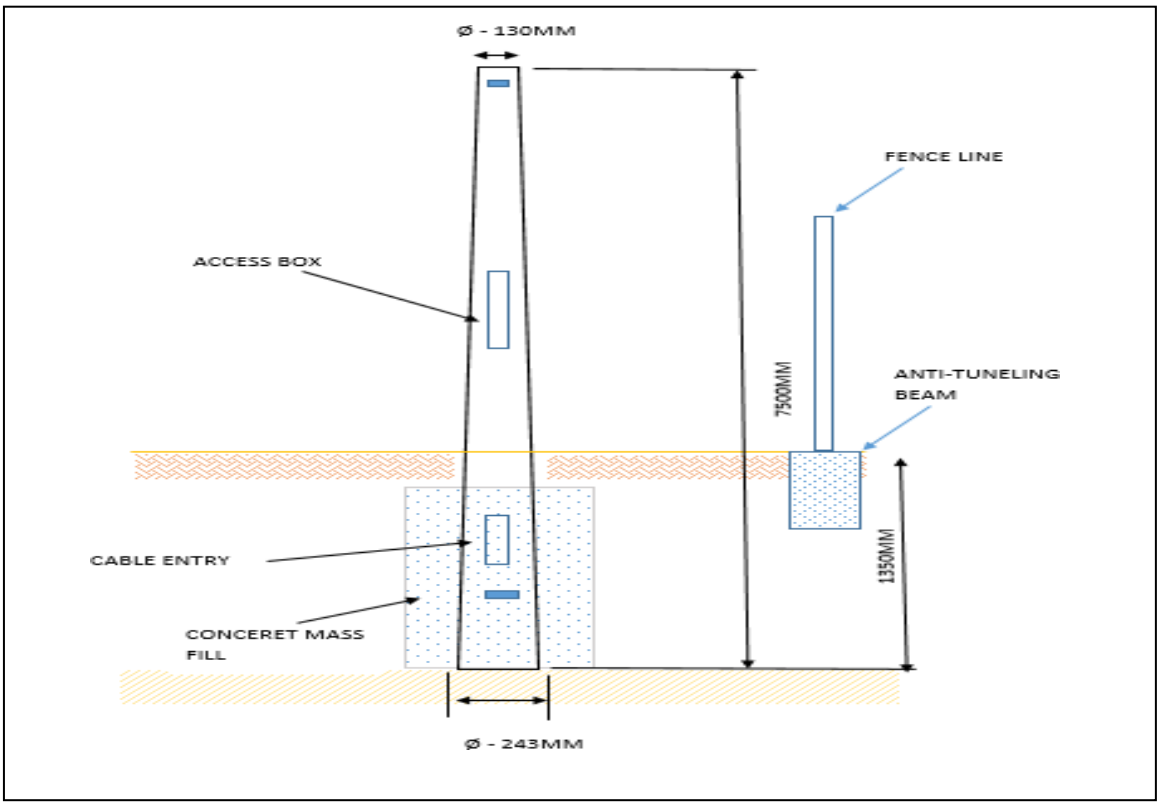


Figure 11: Schematic – CCTV Camera Pole Arrangement

Manholes

The *Contractor* to supply and install manholes that are lockable and watertight to prevent unauthorized access and ingress of water respectively. The manhole cover lids are secured within its frame by means of a locking device or similar. Locking devices shall be designed to allow for the opening of the covers by means of usual tools. Manholes shall be of Heavy-Duty type. Manhole tops shall also adhere to all requirements and specifications per SANS 50124 requirements.

Conduit/Sleeve Pipes

The Contractor to supply, install and test cable conduit sleeve pipes. The specifications of the conduit pipes are detailed below:

- Length of conduit piping – 955m (approximate)
- Conduit Material Type - HDPE
- Conduit diameter size – 110 Nominal Diameter

The conduit sleeves will run through a section of a gravel/surface aggregate road (approximately 48m). This shall be catered for in the design (Refer to **Figure 11** for typical details). Conduit pipes shall adhere to all requirements and specifications as set out in SANS 61386-24. The installation of conduit pipes shallbe in accordance with the SANS 1200 series

Conduit Mandrel Test

The *Contractor* to conduct a mandrel test on the conduit pipes after installation is complete.

- **Electrical Design Scope**

Perimeter Lighting

The current design of the NKP fence lighting system employs 140W HPS (High-Pressure Sodium) floodlights mounted on poles that are spaced 22 meters apart. Each pole holds two floodlights, which are angled to ensure optimal lighting coverage around the area. This setup has been effective in providing sufficient illumination along the fence, leveraging the high intensity and broad light spread characteristic of HPS lights.

In contrast, the new design proposes the use of a single 60W LED light per pole. This new approach aims to deliver an average illumination level of 10 lux or more along the fence, aligning with modern energy efficiency standards and sustainability goals. LEDs are known for their superior energy efficiency, longer lifespan, and better l ight quality compared to traditional HPS lights. The design adjustment involves optimizing the angle and placement of these LED lights to ensure consistent and adequate lighting.

To facilitate a thorough evaluation of the two designs, a 3D model of the new lighting system has been developed. This model illustrates the spatial arrangement and light distribution patterns of the 60W LED lights. Additionally, output light lux data has been generated to demonstrate the performance of the new lighting system. This data includes detailed measurements of lux levels at various points along the fence, providing a comprehensive view of the lighting coverage and intensity.

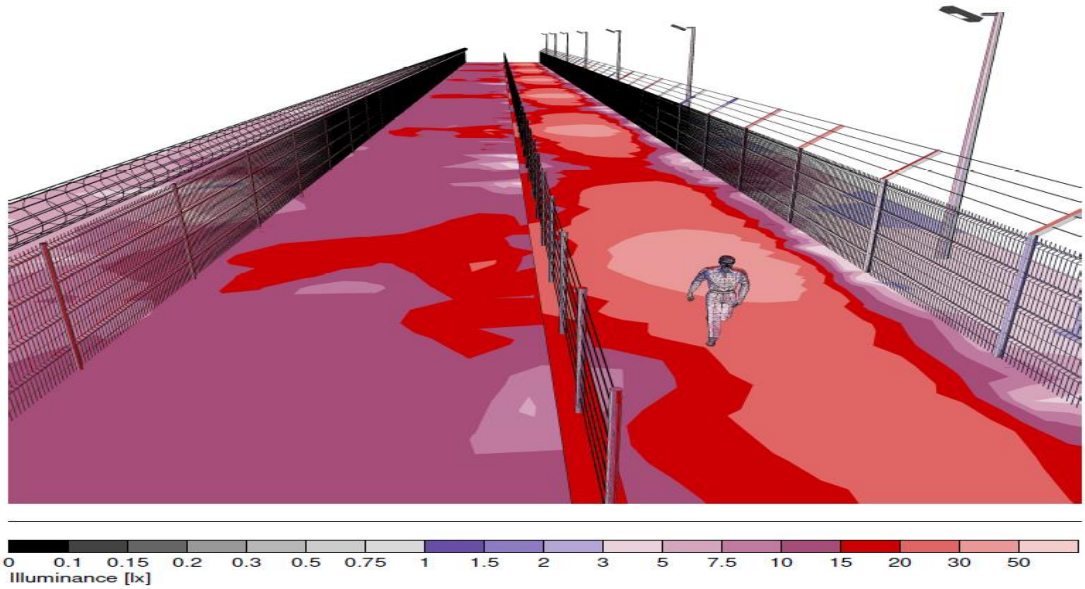


Figure 12: Lighting design for Electric Fence 3-D Model

Colours shown in Figure 10 above show the average lux value produced from the lighting design also providing the average of 14lx around the area which is above the standard value of 10lx.

- **C&I Scope Design**

The existing system is based on a digital video management (DVM) software for surveillance, real time monitoring and recording of events. The existing CCTV system consists of thermal network

cameras for monitoring the perimeter fence, PTZ cameras for monitoring perimeter areas or tracking any intruders, bullet IR cameras for monitoring the perimeter areas, Honeywell enterprise building integrator (EBI) servers, DVM database and camera servers, storage devices, DVM software and license, and DVM operator workstations.

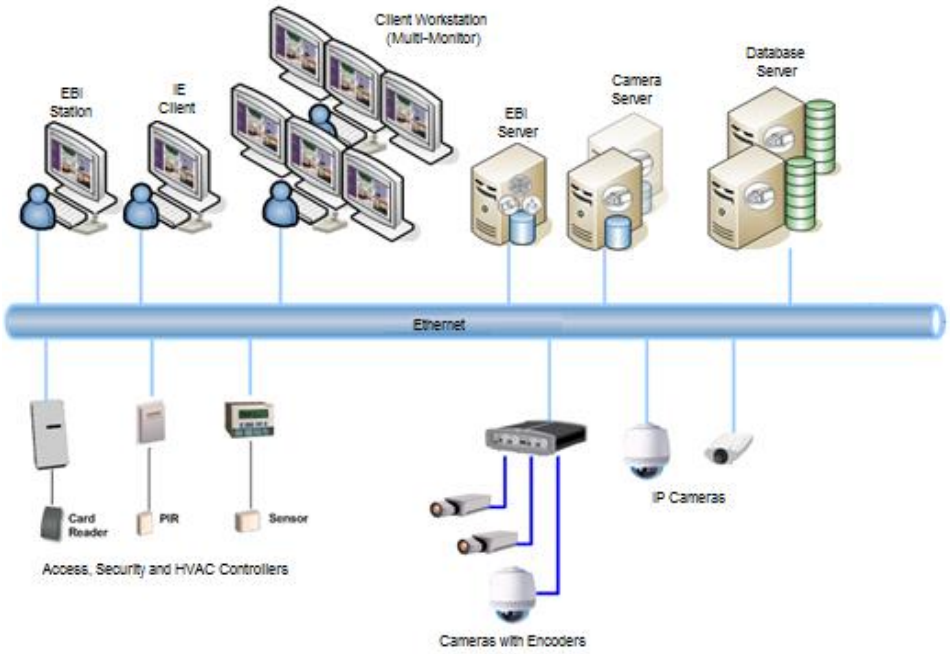


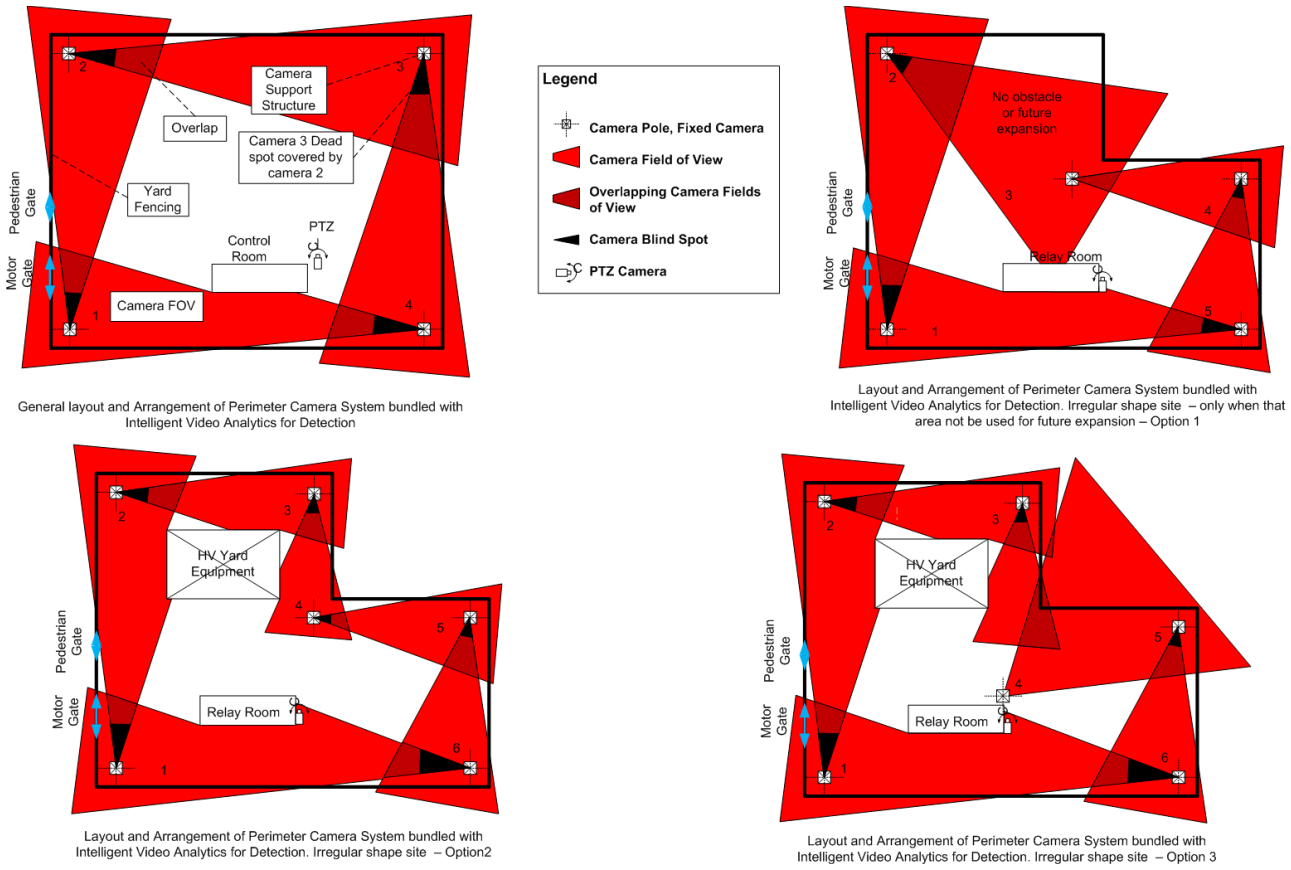
Figure 13: EBI Architecture

The proposed cameras shall be integrated into the existing site CCTV system and shall adopt the operational philosophy of the existing CCTV system. Suitable thermal CCTV technology for the low light conditions is to be utilized to enable no/low light pre-detection of attempted access into the area. The CCTV system must be linked to and monitored by the existing site security control room and must be integrated into the existing perimeter CCTV system. The design must cover the gate with a static camera where a gate exist. The contractor shall adhere to standards and specifications supplied by Eskom. It is highly recommended to propose equipment similar to the existing equipment for spares management and maintainability purposes. In cases where the similar camera are obsolete, replacement model from Honeywell is recommended.

The existing perimeter CCTV consists of the following cameras:

1. Therman network camera (Honeywell Axis-Q1931/E)
2. Fixed network Bullet IR camera (Honeywell – HCD95534)
3. PTZ network camera (Honeywell – HDZ302LIW)

All equipment shall be designed and specified for a minimum realisable operational life 10 years under the prevailing environmental conditions. Visible notification shall be placed at entrances and on the outside of the perimeter fence of the premises to notify persons entering the premises, that they may be subjected to CCTV surveillance. The view of the camera shall be free of any hindering obstacles such as walls, trees or buildings. Perimeter cameras shall be arranged so that the dead spot of each camera is covered by the field of view of another camera. The use of microwave beam detection is strongly discouraged due to the prevalence of nuisance alarms. The perimeter detection system must generate an alarm when a human enters the monitored zone. It must be able to detect a person who is walking upright, walking hunched over, crawling or running.



General layout and Arrangement of Perimeter Camera System bundled with Intelligent Video Analytics for Detection

Layout and Arrangement of Perimeter Camera System bundled with Intelligent Video Analytics for Detection. Irregular shape site – only when that area not be used for future expansion – Option 1

Layout and Arrangement of Perimeter Camera System bundled with Intelligent Video Analytics for Detection. Irregular shape site – Option2

Layout and Arrangement of Perimeter Camera System bundled with Intelligent Video Analytics for Detection. Irregular shape site – Option 3

Figure 14: Examples of Camera Layouts

The perimeter detection cameras shall be mounted on poles which are steel reinforced 4.5m or 5.7m spun concrete. The pole shall be earthed via 50 x 3 mm earth tails which are buried and welded to the base of the fence, the join shall be painted the same as the fence to avoid theft.

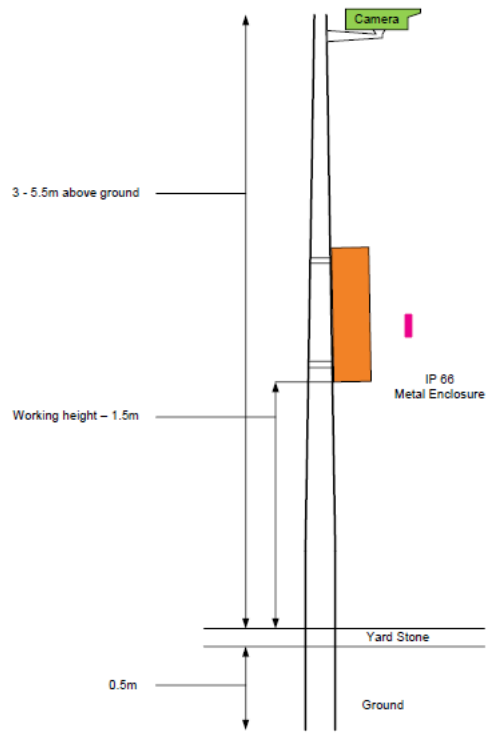


Figure 15: Camera and Metal Enclosure Mounted on Concrete Pole

Proposed CCTV solution shall integrate to the existing site security network. The following functions and specifications shall be met:

a) Monitor for intrusion on the outer fence

b) Monitor for intrusion on the inner fence

c) Monitor general condition of the fence

d) Provide reporting at CBMS level

e) Detection shall not trigger for change of light, movement of trees, small vibrations of the camera pole, animals, and weather conditions.

f) The camera housing shall have an IP rating of at least 65.

g) The camera shall have a sun visor and be steel constructed/ harsh environment housing.

h) A junction box with a minimum IP rating of 65 shall be installed on the camera mounting pole.

i) Fixed Thermal perimeter cameras shall be installed

j) Additionally PTZ cameras shall be installed for intruder tracking.

The perimeter cameras shall adhere to the following CCTV categories:

Purpose	Operational Requirement
Identification	Detail should be sufficient to enable the identity of an individual to be established beyond reasonable doubt. Camera footage alone should be enough to prosecute in court.
Recognition	A high degree of certainty whether or not an individual shown is the same as someone seen before. Camera footage could aid in prosecution along with other evidence.
Observation	Be able to observe what a person is doing.
Detection	Sufficient to determine with a high degree of certainty whether or not a person is present.

The following requirements shall be met for cable routing, wiring and general electrical requirements:

a) All power cables shall be steel wire armoured or laid in appropriately sized plastic conduit.

b) Wireways shall be smooth and free from sharp edges, burrs, fins, or moving parts that may damage wiring.

c) Security systems communication cables and auxiliary power cables shall not be laid in the same conduit unless using fibre communication or DC power.

d) All trunking shall be sized for 30% future expansion.

e) Sufficient slack shall be allowed to ensure that there is no tension in the cables.

f) Ferules shall be used on all wiring into terminals of connectors.

g) Cable selection and routing shall always be done in such a way that operation of equipment is not affected by electrical interference.

h) If power and data cables must cross, it shall be at right angles.

i) No more than two wires shall be terminated at any terminal intersection.

j) Terminal blocks shall be in accordance with Eskom standard 240-70413291, Specification for Electrical Terminal Blocks

k) Joined wires shall be soldered and isolated by means of heat shrink.

l) Ethernet -CAT5 or above shall be utilised.

m) All power cable shall be appropriately sized to ensure voltage drops along cable runs remain within the operating specifications of the equipment being powered.

n) All equipment shall be effectively protected against overvoltage due to lighting strikes or switching surges by strategically placed surge arrestors.

o) Equipment shall not be affected by electrostatic discharges that are applied directly to the equipment or to metal objects in the proximity of the equipment: All electronic equipment shall be a class 2 device as specified in IEEE 1613-2009.

p) All points of cable entry shall be through glands so as to secure the cables.

All equipment shall be labelled in accordance with the design diagrams, with durable, weather resistant labels. All equipment shall be designed for application in ‘special’ environmental conditions as follows:

a) Ambient air temperature: -25 °C to +70 °C.

b) Relative humidity (24h average): 98%.

c) All outside equipment Including fasteners and supports should be corrosion resistant and appropriate for the environment on site.

d) All nuts, bolts and washers use for the construction to be stainless steel. Screws can be cadmium plated.

e) Equipment installed will need added dust protection.

The proposed solution shall consist of a PA system that will be integrated into the existing perimeter PA system linked to the security control room with audibility across the whole extent of the facility. The positioning and quantity of loudspeakers are to be determined by the facility characteristics and in line with the requirements of the PA specification. The speakers shall be weatherproof, environmental, corrosion and vandalism resistant as well as UV resistant. The audio

from the speakers shall be clearly audible throughout the perimeter and be able to handle an alarm siren without distortion.

When an alarm is generated by the alarm system, the CCTV system shall detect the alarm and know what zone was triggered in ordered to trigger the relevant cameras for that zone. The alarm system shall receive trigger signals from CCTV video analytics in addition to triggers from the site's traditional security sensors. Should the intruder detection system be triggered at night, the site's LED floodlights shall be activated for a period of 15 minutes. Should the alarm be triggered, all the floodlights shall be switched on simultaneously to act as a deterrent as well as provide light for the PTZ camera.

Engineering and the *Contractor's* design

c) *Employer's* Design

The *Employer* has conducted the concept design of the works, the extent of which is detailed in document: KUS-202211157: Kusile Power Station Refurbishment of the ex-GE Store Concept Design Report. Drawings to be issued by the Employer are listed in Table 2 below:

Table 3: Drawings issued by the *Employer*.

Drawing number	Title	Revision
Civil Drawings		
Mechanical Fencing		
0.90/706	Kusile Power Station Security Fence Double Swing Access Gate Plan, Elevations and Details	6
0.90/707	Kusile Power Station Security Fence Post Concrete Bases and Gate Keep Detail	2
146838-0UYX-S3916B	Kusile Power Station Security Fence Access Gate Posts Plan, Elevations and Details	0
0.90/709	Kusile Power Station Security Fence Details of Posts and Struts	1
0.90/710	Kusile Power Station Security Fence Weldmesh Termination and Fixing Details	1
0.90/710	Kusile Power Station Security Fence Access Gate Post and Wiring Protection Details	1
Drawing number	**Title**	**Revision**
Civil Drawings		
0.90/711	Kusile Power Station Security Fence Access Gate Post and Wiring Protection Details	1
0.90/712	Kusile Power Station Security Fence With Overhang Brackets Layout and Details	1

0.90/59093	Kusile Power Station Security Fence Single Swing Access Gate Plan, Elevations and Details	4
0.90/59094	Kusile Power Station Security Fence Gate Post Foundations	2
0.90/59095	Kusile Power Station Security Fence Single Swing Gate Keep Details	0
0.90/23490	Kusile Power Station Fence Bridge – Foundations Plans, Sections and Details Fence Bridge 1	0
0.90/23491	Kusile Power Station Fence Bridge – Foundations Plans, Sections and Details Fence Bridge 1	0
0.90/23492	Kusile Power Station Fence Bridge – Foundations Plans, Sections and Details Fence Bridge 1	0
0.90/24999	Kusile Power Station Fence Bridge – Foundations Plans, Sections and Details Fence Bridge 2	0
0.90/25015	Kusile Power Station Fence Bridge – Foundations Plans, Sections and Details Fence Bridge 2	0
0.90/25016	Kusile Power Station Fence Bridge – Foundations Plans, Sections and Details Fence Bridge 2	0
Electric Fence		
0.90/49949	Kusile Power Station Concrete Slab and Post Installation	0

Parts of the *Works* which the *Contractor* is to design

a) The *Contractor* provides engineering design services in accordance with the Engineering Profession Act, 46 of 2000, Guideline for Professional Fees: Scope of services and Tariff of Fees for Registered Persons. The *Contractor* appoints and manages his *Subcontractors* for the project scope. The *Contractor* co-ordinates the work of his *Subcontractors* and satisfies the requirements of all relevant standards and regulations. The *Contractor* co-ordinates all interfaces to ensure design integration for all components of the project scope.

Additional Services pertaining to all stages of the project include:

- The *Contractor* reviews design data prepared by others, that interface or may impact his designs, for purposes of delivering sound engineering designs
- The *Contractor* performs all required surveys, analyses, tests and investigations necessary to carry out the *Works*
- The *Contractor* is responsible for setting out or staking out the works and indicating any boundary beacons and other reference marks pertaining to the project scope
- The *Contractor prepares and* provides record drawings indicating all deviations from construction drawings. These includes changes to designs done by others or related to alterations to existing *works*

b) The *Consultant* is mandated in terms of the Construction Regulations 2014: Duties of Designer, 6(1) g to fulfil the duties described therein. Any risks associated with the *Consultant's* design is highlighted to the *Employer* together with the mitigation measures

c) The *Contractor's* design is required to be in accordance with all National Standards and Specifications referenced in this Works Information as well as the *Employer's* Standards referenced in Section 9.

d) The *Contractor* performs reviews of existing design data for purposes of performing his designs. The assessment is performed by review of the following but not limited to:

- Design drawings
- Design reports
- Investigation reports i.e., geotechnical report
- Operating and maintenance manuals etc

Functional and Value-Add Design Changes

Proposed design changes are performed prior start of the *works,* by the *Contractor*. The design changes are classified as "Functional" or "Value-Add" changes. Functional changes are driven by changes to design functionality to address design flaws, omissions and/or deficiencies. Value-add changes primarily focus on cost and time reductions through design efficiency. Engineering design changes that arise during construction are catered for separately by the *Contractor*.

The *Contractor* makes provision for a **minimum** of 150 hours of Engineering Design Support and 150 hours for Draughtsperson Support for "Functional Changes" as defined above. These hours will be used on an as-required basis based on the outcome of the design review of existing design data. The *Contractor* obtains approval from the *Employer* before making use of the allocated hours. **These hours are over and above the hours provided for by the *Contractor* for changes required during construction as a result of contractor queries etc.**

The *Contractor* makes provision for a **minimum** of 150 hours of Engineering Design Support and 200 hours for Draughtsperson Support for "Value-Add Changes" as defined above. These hours will be used on an as-required basis based on the outcome of the design reviews. The *Contractor* obtains approval from the *Employer* before making use of the allocated hours. **These hours are over and above the hours provided for by the *Contractor* for changes required during construction as a result of contractor queries etc.**
The *Contractor* provides motivations in the form of a Technical Report regarding any proposed engineering design modifications, as well as the time and cost implications of such changes. Only changes that will prohibit the *Contractor* from issuing Completion Certificates upon completion of the *works*, changes that impact execution of the *works* or changes that will have significant value-add impact for the *Employer,* will be considered for acceptance by the *Employer.*

e) The *Contractor* performs design changes for purposes of completing his designs. The *Contractor* incorporates the design changes/modifications into the original designs including the finalisation of any affected drawing, schedule, report and/or specification etc.

f) The *Consultan*t assumes full design accountability and liability for his designs (temporary works included)

g) All designs, design reports and construction drawings prepared by the *Contractor* are signed off by an Architectural Professional (registered with SACAP) and Professional Engineers or Technologists (registered with ECSA), who take full professional accountability for the designs.

h) The *Contractor* submits a Level 4 schedule (schedule with defined activities) for the design scope, highlighting all design activities and milestones

Procedure for Submission and Acceptance of *Contractor's* Design

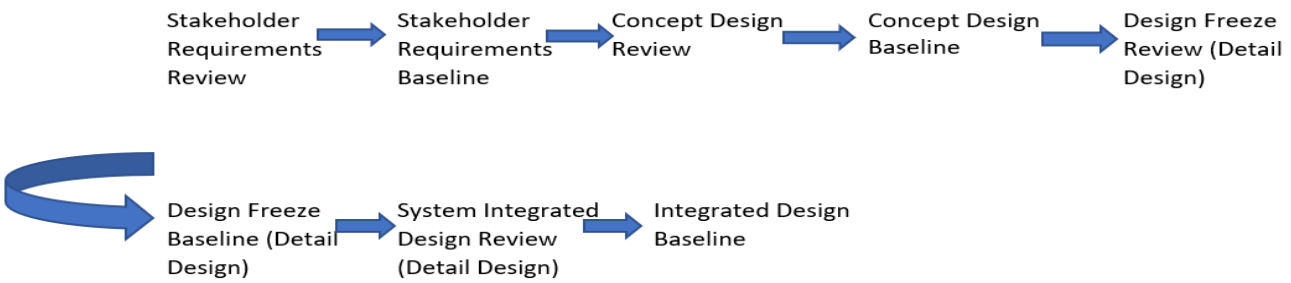
The *Contractor* shall conduct design reviews in accordance with the *Employers* Design Review Procedure, 240-53113685 and participate in all reviews as specified by the *Employer.*

The *Contractor* notes that he is the Design Authority as defined in the *Employer's* Design Review Procedure for the project scope. The design authority remains responsible and accountable for the correctness of the design documents, irrespective of whether these documents have been reviewed by the *Employer*.

The following documentation review process is followed for submission of documents:

- The *Contractor* submits the documents to the *Project Manager* for review. The *Contractor* shall allow the *Project Manager* 21 days to review and respond to the *Contractor*'s document submission i.e., from time of receipt by the *Project Manager*
- The *Employer's* project team reviews the documents and submit all comments to the *Project Manager*. On receipt of the reviewed documentation, the *Contractor* makes any modifications requested by the project team and resubmits the revised documents to the *Project Manager* within two (2) weeks of receipt. Queries regarding comments/changes made by the *Employer's* project team are addressed with the *Project Manager* prior re-submittal of documentation. Document re-submittals which have not included the comments identified, will be returned to the *Contractor* for correction. The *Contractor* shall re-issue the revised documentation incorporating all comments and details not included in the previous document issue, within 2 (two) working days of receipt.

  The *Contractor* notes that no costs arising from any revisions, which are a result of the *Contractor's* omission, may be claimed from the *Employer*. This includes costs incurred by the *Contractor* in completing such designs and drawings
- The *Contractor* organises review sessions once all noted comments have been addressed and documents revised. If any further issues are found during the review process or further actions are required, the *Contractor* records all concerns and revises the documents accordingly. The Contractor compiles an end-of phase design review report and submits to the *Project Manager* for acceptance, upon completion of the review stage. The design review process follows the below process flow;



Change Management

Engineering design changes are performed in accordance to the latest revision of the Eskom Project Change Management Procedure [240-53114026]. The *Employer* ensures that *Contractor* is provided with latest revision of this procedure. Any uncertainty regarding this procedure should be clarified with the *Employer*.

Acceptance of the *Contractor's* Design

The *Contractor* implements the following for design acceptance:

a) The *Employer* accepts the *Contractor's* design upon completion of reviews by the *Employer's* project team.

b) The *Contractor* stamps, dates and signs his designs, to signify approval of his designs.

c) The *Contractor* informs the *Employer* in writing of any deviation in the *Contractor's* drawings, from the scope requirements.

Other Requirements of the *Contractor's* Design

Construction & Commissioning Monitoring

The *Contactor* provides construction and commissioning supervision in accordance with Level 4 of the ECSA Guideline Scope of Services and Tariff of Fees for Registered Persons [Engineering Profession Act, 2000, (Act No. 46 of 2000)]. The *Works* include the provision of on-site personnel during construction, as deemed necessary by the *Contactor*. These services shall be required for the duration of the *Works.* The duties of the *Contactor* are detailed below but not limited to the following:

- Perform technical oversight of the project i.e., respond to technical queries during construction and commissioning activities including but not limited to the review of construction work procedures, quality control plans, material approvals, survey approvals, requests for information, concessions, data books etc.
- Monitor construction and commissioning activities to ensure compliance with the project scope requirements
- Management of project interfaces etc.

Site Supervision

The *Contractor* provides a full-time construction supervision team on site for construction and

commissioning activities. The following key responsibilities shall apply:

- Supervise and report on *Contractor's* performance;
- Submit daily diaries/daily progress reports to the *Employer*
- Should 24-hour construction monitoring be required, additional resources will be required to manage the work load
- Comply to all *Employer* and site related governance and safety, health, environment, risk requirements

Use of the *Contractor's* Design

The *Contractor* notes that all his design data, that is presented to the *Employer* in relation to the *Works,* become the property of the *Employer*. The *Employer* has total rights to use the *Contractor's* designs, as the *Employer* requires i.e., construction, refurbishment, repair, maintenance etc.

As-built Drawings, operating manuals and maintenance schedules

As-built Drawings

The *Contractor* provides "As Built" drawings/documentation for all his designs. The designs to embody all modifications made during construction. "As Built" documentation to be provided for the entire project scope i.e., Architechural, Civil & Structural, Mechanical, Electrical and C&I works etc.

Drawings issued to the Employer will be a minimum of one hardcopy and an electronic copy. The *Contractor* is required to submit drawings electronically in both native CADD format and PDF format. Drawings issued to the Employer may not be “Right Protected” or encrypted.

Operating Manuals and Maintenance schedules

The *Contractor* shall prepare and submit operating and maintenance manuals (O&M) for equipment items under this contract. The manuals provide a detailed record of the safe operation and maintenance of the items. The *Contractor* submits the documentation to the *Employer* for review and acceptance. The *Contractor* submits the O&M manuals prior undertaking test and commissioning activities.

The manuals to provide comprehensive information on the following but not limited to:

a) Equipment technical data

b) Detailed drawings of equipment items

c) Operating procedure of equipment items

d) Prescribed maintenance schedule or routine maintenance procedures/instructions per manufacturer requirements

e) Commissioning procedures

f) Preservation and storage requirements

Construction

Temporary works, Site services & construction constraints

General

The *Contractor* duties include the following:

- Submits a cost proposal for the *Works*
- Submits a project specific safety file to the *Employer* for acceptance, prior to the start of *Works*
- Submit a detailed level 4 schedule for the works to the *Project Manager* for acceptance after contract award
- Manage his activities on site to ensure that no interference takes place between his work and that of others.
- Supply to the *Employer*, all consumer power requirements, potable water requirements and any other termination interface requirements that are required to complete the *Works*
- The *Contractor* confirms the available space in the site area for construction of the *Works* taking note of all existing services, pipes, structures, and any obstructions to the
- The *Contractor* to furnish all material, labour, and equipment necessary to perform and complete the *Works*.
- Provides a detailed Construction Method Statement for all work activities and details the activity durations. All method statements are reviewed and accepted by the *Employer* prior commencement of the *Works.* The *Contractor* in his method statements includes the following as a minimum:

- A comprehensive construction methodology of the project activities.
- A clear description of the responsibilities of the *Contractor’s* personnel involved in the activity,

- Health, safety and quality control considerations for the activity.
- All plant, equipment and machinery required to complete the project activity.
- Temporary works to be used for the Works.
- Technical Data Sheets for all materials used including product description, composition, material and performance properties, installation, application procedures and product use limitations etc.
- Plans for confining, collecting, and disposing of waste materials as a result of removal operations, where applicable.
- *Works* required to safeguard existing infrastructure and services

- The *Contractor* shall arrange for all required test works for process control.
- The *Contractor* is responsible for quality control and management of the assigned *Works*
- The *Contractor* submits as-built drawings for all the components of the finished *Works* to the
- The *Contractor* shall compile and submit a data package for the completed *Works*. The documentation shall include but not limited to the following:

- Construction drawings used to execute the *Works*
- Approved construction method statement, QCP/ITPs
- Material certificates/data sheets

Surveying and Setting Out of the *Works*

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

b) The *Contractor* is required to submit as-built and/or red-line data and drawings of the completed *works* to the *Project Manager* upon handover. As-built drawings are submitted in PDF and native CAD (.DGN) formats.

c) The *Contractor* is responsible for the verification of all survey data relating to setting out and to immediately inform the *Project Manager* of any discrepancies as soon as these are discovered.

d) The final position of the new infrastructure i.e., ablution block, guardhouse, potable and fire water infrastructure is determined by the *Contractor* with the ideal location indicated on the issued drawings.

Site Preparation & Clearance

The *Contracto*r shall prepare the site for construction by clearing, removing and disposing of all unsuitable material and obstructions not forming part of the *Works.* The construction works include the removal of ~700m of razor mesh fencing and preparation of the site along the fencing line. The *Contractor* adheres to the latest revision of the ***Employer's*** Execution of Site Preparation and Earthworks Standard [19], SANS 1200 series and SANS 2001 BE1. The *Contractor* shall be responsible for the disposal of all waste within the construction area. All excavated excess or unsuitable materials shall be disposed of at a designated spoil site. Hazardous waste shall be disposed of at a registered waste disposal site, to be approved by the *Employer.*

Excavations and Associated Water Control

Excavations & Scanning of Underground Services
No excavations are permitted without an excavation permit obtained from the *Project Manager.* The *Contractor* complies with the requirements of the Construction Regulations, Execution of Site Preparation and Earthworks [19] and the Kusile Trench and Excavation Procedure [203-13626]. Scanning of underground services shall precede all excavation works. The *Contractor* performs geophysical assessments for detection of subsurface utilities, prior undertaking excavations. The geophysical scanning method employed is at the discretion of the *Contracto*r. The *Contractor* therefore considers the work area prior to selection of test methodology and equipment. The *Contractor* submits the results of the scans to the *Project Manager* and indicates possible services which may interfere with the *works*. The *Contractor* shall obtain all relevant drawings, indicating the position of potential underground services around the work area. Care shall be taken by the *Contractor* to properly demarcate and protect all underground utilities. If any service or structure is damaged by the *Contractor*, that should have been located or protected by the *Contractor*, the *Contractor* shall be liable for the repair works. All excavation *works* shall be carried out in accordance with the SANS 1200 series and SANS 2001 BE1.

Water Control on the *Works*

The *Contractor* is responsible for the control of water during construction including the dewatering of excavations, to ensure the safety of the *Works*. The *Contractor* provides, operates and maintains all required equipment for this purpose i.e., pump equipment, well points etc. The *Contractor* is responsible for the design, construction and maintenance of all temporary drainage controls i.e., sumps, drains, trenches and any other temporary works that may be necessary for the dewatering and protection of the permanent *Works*.

The *Contractor* re-instates temporary drainage controls, when no longer required. The *Contractor* is responsible for the repair of damaged *Works* caused by floods, water, or failure of any part of the dewatering and flood protection controls. The *Contractor's* attention is drawn to the fact that, during rain events and seasons, high water tables may be encountered on site. The cost of the protection works, including rectification of damages, shall be borne by the *Contractor*.

Temporary *Works*

The *Contractor* is responsible for the design of all temporary works and is mandated in terms of Construction Regulations 2014: Duties of Designer, 6(2) a – d, to fulfil the duties described therein for all temporary work designs.

C*ontractor 's* Programme

a) The *Contractor* submits to the *Employer*, a level 4 single integrated programme for the project scope.

b) The *Contractor* submits an electronic copy of his programme in MS Project (MPP) format. The *Contractor* includes the following as a minimum in his programme:

- Start and completion dates
- Order and timing of project activities which the
- Order and timing of project activities which the *Contractor* is to perform

Submission Of Revised Programmes and Progress Reporting

The *Contractor* submits his revised programme bi-weekly or as instructed by the *Employer*. The *Contractor* indicates on each revised programme:

- Actual progress achieved on each project activity and its effect on the timing of the remaining *works*.
- Management of delays encountered etc.

Completion, Testing, Commissioning and Correction of Defects

Testing Requirements

The *Contractor* shall be responsible for all testing of the *Works*. The *Works* shall be tested in accordance with the latest standards and procedures as outlined in the South African National Standards (SANS) as well as other applicable codes of practice. The cost of testing undertaken by the *Contractor* in terms of his obligations under the contract including the taking of samples, reinstating where samples have been taken and all testing equipment, labour, materials, etc. must be included in the rates tendered for and will not be paid for separately.

The following tests are conducted by the *Contractor* but not limited to:

- Field and laboratory testing associated with the construction works i.e., concrete and earthworks. Below is a list of tests that the *Contractor* shall perform on soil samples, as a minimum:

- Identification tests - Atterberg Limits and Sieve analysis
- Soil compaction tests i.e. moisture/density relationship at Modified AASHTO compaction effort and California Bearing Ratio (CBR)

Laboratory Testing

All laboratory testing is conducted in accordance with the latest standard methods and procedures as outlined by the appropriate authorities (B.S/ Euro Code equivalent, A.S.T.M, A.A.S.H.T.O, I.S.R.M, S.A.B.S / S.A.N.S).

Materials facilities and samples for test and inspections

a) The *Contractor* provides all materials, facilities and/or samples required for all tests and inspections.

b) The *Employer* reserves the right to call for samples of equipment offered to inspect the workmanship as the work proceeds and either accepts or rejects the equipment or workmanship. The *Contractor* remains fully liable to provide complete and proper working plant.

1) Miscellaneous Materials and Services

The *Contractor* makes provision for the following but not limited to:

- Erection tools, special tools and test equipment required for erection, testing, startup, and operation of the equipment, including shipping/delivery costs to and from the jobsite.
- Construction services, storage facilities, and utilities specified herein.
- Other miscellaneous materials and services required to complete the work that is not specifically indicated herein.
- Provision of construction power and temporary lighting, including designing, furnishing, erecting, maintaining, and removal thereof, when no longer required
- Supply, install and remove all temporary support structures.
- Survey and lay out the work from the *Employer's* or Project Field Manager's designated control points.
- All welding materials, equipment and consumables required for attachment of equipment, piping, or structural steel furnished under these specifications.
- Protection of existing underground utilities, foundations, buildings, and equipment.
- Solvents and cleaning materials.
- Hazardous Material Safety Data Sheets (MSDS) for all materials supplied by *Contractor*.
- Construction consumables.
- Supply, surface preparation and application of painting and galvanizing of all *Contractor*-furnished piping and structural steel, in accordance with Eskom Standard SSZ_45-17, Medupi Power Station Corrosion Protection Specification.
- Touch-up prime and touch-up finish paint all furnished painted piping, piping attachments and accessories, and structural steel members. *Contractor* shall furnish all materials required for surface preparation and painting. No touch-up galvanizing will per permitted except to exposed threads after assembly or per *Employer* review and approval. Materials shall be re-dipped if touch up galvanizing is required.
- Restoration of *Contractor* damage to the site.
- Furnish and install symbolic safety signs per SANS 1186 for *Contractor* installed equipment.
- Maintenance of accurate as-built drawings for all erection work and delivery of final as-built drawings to the *Employer*.
- Attendance at coordination meetings at the site at a time selected by the *Employer* to discuss matters relative to the execution of this contract.
- Initial and final fill of oils, greases, and other lubricants to equipment installed by the *Contractor*.
- Grout, pour concrete, set, align and erect all furnished pipe support foundations that are to be installed under this contract, including foundations, foundation bolts, and bolt sleeves, *Contractor* shall furnish and erect for all pipe support foundations all grouting materials and the placing thereof.

Pre-Commissioning Tests and Commissioning

- The *Contractor* is responsible for all commissioning activities of mechanical, electrical and C&I systems, installed by the *Contractor*, including but not limited to the planning, provision of labour, plant, material, equipment and supervision of the activities. Commissioning activities are performed in accordance with the On-Site Commissioning for Low Pressure Systems Standard [240-56356376] etc.

- The *Contractor* shall perform all tests as required by Sections or Clauses of the *Works* Information and all tests required by the *Employer's* Specifications annexed thereto, and all tests required by any applicable South African National Standard, or other Standard, and/or as directed by the *Employer's* and the *Project Manager*.

- Commissioning procedures are prepared by the *Contractor* for each plant system. The procedures are reviewed and approved by the *Employer* prior commencement of activities.

- The *Contractor* shall supply all relevant test equipment, monitoring devices etc. required to test and commission the complete *Works*.

- Accurate records of commissioning and test activities are submitted as part of handover documentation.

- **Factory Acceptance Testing**

The *Contractor* shall perform all routine factory tests on selected electrical and mechanical plant, as required by the *Employer*. FATs are performed at the supplier's premises before equipment is despatched to site. The *Contractor* provides test reports, certificates and any other statutory documentation, where applicable, for applicable equipment. The test reports contain the following information as a minimum:

- Technical data of component

- Test type/method

- Test evaluation results

- **Performance Testing**

The *Contractor* carries out performance tests on selected electrical and mechanical equipment, as required by the *Employer.* Performance tests are performed at the supplier's premises before dispatchment of equipment to site. The *Contractor* prepares and submits for review and acceptance, testing procedures, Quality Control Plans and the acceptance criteria, prior commencement of tests. A representative of the *Employer* shall witness the performance tests but in doing so, the *Contractor* notes that the *Employer* assumes no responsibility or accountability for the proper functionality of plant or equipment. The *Contractor* arranges with the *Project Manager*

for witnessing of test activities. The *Contractor* submits all test certificates and/or records for the test activities. The *Contractor* to supply all labour, materials, plant, and equipment for this purpose.

- **Site Acceptance Tests**

The *Contractor* performs site acceptance testing for selected plant and equipment, as required by the *Employer.* SATs are performed at the *Employer's* premises and witnessed by a representative of the *Employer*. Installations shall be comprehensively tested and commissioned as individual and integrated systems as may be required by the configuration, after completion of *Works*. The *Contractor* shall provide adequate and competent personnel for testing and commissioning activities, for the full duration of the commissioning process. The *Contractor* to supply all labour, materials, plant, and equipment for the required tests. The *Contractor* notes that witnessing of tests by the *Employe*r, shall only be made after the *Contractor* has pre-commissioned the equipment and satisfied himself that it is in working or running order.

The *Contractor* arranges with the *Project Manager* for the witnessing of test activities. The *Contractor* submits all test certificates/records as well as any prescribed statutory documents, where applicable, certifying that the equipment is in complete working order. Where required, the *Contractor* to provide the initial fill of oil/lubrication/grease and any other consumables, for the commissioning and test activities.

- **Commissioning Procedures and Programme**

The *Contractor* submits to the *Project Manager*, a detailed programme of the planned commissioning activities at least 14 days before commissioning commences. The commissioning programme to include the following but not limited to:

- A schedule of equipment to be commissioned, the proposed tests to be conducted and the testing methods
- Commissioning check sheets
- Commissioning programme dates and duration.

Access for Correction of Defects

Should the *Contractor* need to return to the site after completion of the *works* to conduct an improvement or repair, the *Contractor* arranges all resources, plant and equipment required to

Plant and Materials standards and workmanship

Materials, Workmanship and Products

- **Materials and Workmanship**

Only new and undamaged materials are to be used in the *Works*. Materials to be permanently installed into the *Works* are not to be used for any temporary purposes on site. Work is required to be for the acceptance of the *Employer* and is executed in accordance with the relevant manufacturer's written recommendations and instructions.

Civil engineering and structural works

The scope of Works shall be performed in accordance with the South African National Standards, prescribed Eskom standards and any other applicable codes of practice, specifications, and regulations. Reference to standards or manuals, whether such reference is specific or by implication, shall mean the latest standard, manual, or code in effect at the time of the contract award. The *Contractor* adheres to the normative references in section 2.1.4. If there is any contradiction within the codes and standards, the *Contractor* liaises with the Employer for clarification. The *Contractor* notes that the provided lists are not all-inclusive and do not relieve the *Contractor* from complying with all applicable design codes. The *Contractor* notes that the lists are not all-inclusive and do not relieve the *Contractor* from complying with all applicable codes.

Structural steelwork

The *Contractor* adheres to the latest issue of the listed standards/codes/publications. The *Contractor* notes that the list is not all-inclusive and does not relieve the *Contractor* from complying with all applicable codes.

Table 4: List of Applicable Standards for Structural Steelwork

Code	Description
SANS 121	Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods
SANS 455	Covered electrodes for manual arc welding of carbon steels
SANS 517	Light Steel Frame Building
SANS 657	Steel tubes for non-pressure purposes
SANS 679	Zinc chromate primers for steel
SANS 681	Undercoats for paints
SANS 684	Structural steel paint
SANS 1273	Fasteners for roof and wall coverings in the form of sheeting
SANS 1465	Steel castings for general engineering applications
SANS 1700	Fasteners
SANS 1921-3	Construction and management requirements for works contracts, Part 3: Structural steelwork
SANS 2001-CS1	Construction works Part CS1: Structural steelwork
SANS 3834	Quality requirements or fusion welding of metallic materials
SANS 4042	Fasteners – Electroplated coatings
SANS 10044	Welding
SANS 10064	The preparation of steel surfaces for coating
SANS 10085	The design, erection, use and inspection of access scaffolding
SANS 10094	The use of high-strength friction grip bolts
SANS 10104	Hand railing and balustrading (safety aspects)
SANS 10120	Code of practice for use with standardised specifications for civil engineering construction and contract documents
SANS 10162	The structural use of steel
SANS 10177	Fire testing of materials, components and elements used in buildings
SANS 10237	Roof and side cladding
SANS 10400	The application of the National Building Regulations

Code	Description
SANS 10684	Fasteners – Hot dip galvanised coatings
SANS 14399	High strength structural bolting assemblies for preloading
SANS 14713	Protection against corrosion of iron and steel in structures – zinc and aluminium coatings – guidelines (ISO 14713)
SANS 15609	Specification and qualification of welding procedures for metallic materials – welding procedure specification
SANS 15614	Specification and qualification of welding procedures for metallic materials – welding procedure test
SANS 16961	Petroleum, petrochemical and natural gas industries – Internal coating and lining of steel storage tanks
SANS 23279	Non-destruction
SANS 50025	Hot rolled products of structural steels
SANS 50028	Flat products made of steels for pressure purposes
SANS 50219	Cold formed welded structural hollow sections of non-alloy and fine grain steels Part 1 – Technical delivery
EN 10210-1	Hot finished structural hollow sections of non-alloy and fine grain steels – Part 1: Technical delivery requirements
EN 10210-2	Hot finished structural hollow sections of non-alloy and fine grain structural steels – Part 2: Tolerances, dimensions and sectional properties
ANSI/AWS A5.1/A5.1M	Specification for carbon steel electrodes for shielded metal arc welding
ANSI/AWS A5.17/A5.17M	Specification for carbon steel electrodes and fluxes for submerged arc welding
ANSI/AWS A5.18/A5.18M	Specification for carbon steel electrodes and rods for gas shielded arc welding
ANSI/AWS A5.20	Specification for carbon steel electrodes for flux cored arc welding
ASTM A 6/A 6Mb	Standard specification for general requirements for rolled structural steel bars, plates, shapes and sheet piling
ANSI/AWS D1.1/D1.1M	Structural welding code – steel
BS 4-1	Structural steel sections – Part 1: Specification for hot-rolled sections
DIN 1026-1	Hot rolled steel channels – Part 1: Taper flange steel channels - dimensions, masses and sectional properties
EN 10024	Hot rolled taper flange I sections – Tolerances on shape and dimensions
EN 10025-2	Hot rolled products of structural steels – Part 2: Technical delivery conditions for non-alloy structural steels
EN 10034	Structural steel I and H sections – Tolerances on shape and dimensions
EN 10056-2	Structural steel equal and unequal leg angles – Part 2: Tolerances on shape and dimensions
ISO 8501-1	Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness – Part 1: Rust grades and reparation grades of uncoated steel substrates and of steel substrates after overall removal of precious coatings

Corrosion protection

The *Employer* uses extracts and variations from SANS 1200HC as part of the *Employer's* requirements, even though this standard has been withdrawn. All corrosion protection conforms to the requirements of 240-106365693 'Standard for the External Corrosion Protection of Plant,

Equipment and Associated Piping with Coatings' as a minimum. The *Contractor* adheres to the latest issue of the listed standards/codes/publications. The Contractor notes that the list is not all-inclusive and does not relieve the Contractor from complying with all applicable codes.

Table 5: List of Applicable Standards for Structural Steelwork

Code	Description
34-1658	Distribution Standards – Part 0: Corrosion Protection Specification for New Indoor and Outdoor distribution Equipment, components, materials and structures manufactured from steel
240-106365693	Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings
ASTM E376	Measuring coating thickness by magnetic field or eddy current electromagnetic test methods
ASTM D4541	Standard method for pull-off strength of coatings using portable adhesion testers
ISO 12944	Paint and varnishes – Corrosion protection of steel structures by protective paint systems
ISO 4624	Paints and varnishes – Pull-off test for adhesion
ISO 4628	Paints and varnishes
ISO 8501-1	Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness – Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings
ISO 8501-4	Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness – Part 4: Initial surface conditions, preparation grades and flash rust grades in connection with high-pressure water jetting.
ISO 8502-3	Preparation of steel substrates before application of paint and related products – Tests for the assessment of surface cleanliness-Part 3: Assessment of dust on steel surfaces prepared for painting (pressure sensitive tape method).
ISO 8503-4	Preparation of steel substrates before application of paint and related products – Surface roughness characteristics of blast cleaned steel substrates – Part 4: Method for the calibration of ISO surface profile comparators and for the determination of surface profile – stylus instrument procedure
ISO 8504	Preparation of steel substrates before application of paint and related products – Surface preparation methods
ISO 9001	Quality Management System
SANS 110	Sealing compounds for the building industry, two-component, polysulphide base
SANS 121	Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods
SABS 763	Hot-dip (galvanised) zinc coatings (other than on continuously zinc-coated sheet and wire)
SANS 1077	Sealing compounds for the building and construction industry, two-component, polyurethane-base
SANS 1091	National colour standard
SANS 1217	Internal and external organic coating protection for buried steel pipelines
SANS 1700-5-8	Fasteners Part 5: General requirements and mechanical properties Section 8: Mechanical properties of corrosion-resistant stainless-steel fasteners - Bolts, screws and studs
SANS 1700-5-9	Fasteners Part 5: General requirements and mechanical properties Section 9: Mechanical properties of corrosion-resistant stainless-steel fasteners - Nuts
SANS 1700-5-10	Fasteners Part 5: General requirements and mechanical properties Section 10: Mechanical properties of corrosion-resistant stainless-steel fasteners - Set screws and similar fasteners not under tensile stress
SANS 1700-5-18	Fasteners Part 5: General requirements and mechanical properties Section 18: Fasteners

Code	Description
	- Non-electrolytically applied zinc flake coatings
SANS 2063	Thermal spraying - Metallic and other inorganic coatings - Zinc, aluminium and their alloys
SANS 2808	Paints and varnishes – Determination of film thickness
SANS 5159	Adhesion of paint and varnish films (cross cut test)
SANS 5769	Cleanliness of blast cleaned surfaces for painting (assessed by freedom from dust and debris)
SANS 5772	Profile of blast cleaned surfaces for painting (determined by a micrometre profile gauge)
SANS 5870	Hardness of vulcanized rubbers of hardness 30 — 95 degrees
SANS 10064	The preparation of steel surfaces for coating
SANS 10104	Hand railing and balustrading (safety aspects)
SANS 10120-2 HC	Code of practice for use with standardized specifications for civil engineering construction and contract documents Part 2: Project specification Section HC: Corrosion protection of structural steelwork
SANS 10120-4 HC	Code of practice for use with standardized specifications for civil engineering construction and contract documents Part 4: Typical schedule of quantities Section HC: Corrosion protection of structural steelwork
SANS 10120-5 HC	Code of practice for use with standardized specifications for civil engineering construction and contract documents Part 5: Contract administration Section HC: Corrosion protection of structural steelwork
SANS 10121	Cathodic protection of buried and submerged structures
SANS 10140	Identification colour marking
SANS 10214	The design, fabrication and inspection of articles for hot-dip galvanising
SANS 12944-1	Paints and varnishes - Corrosion protection of steel structures by protective paint systems Part 1: General introduction
SANS 12944-2	Paints and varnishes - Corrosion protection of steel structures by protective paint systems Part 2: Classification of environments
SANS 12944-3	Paints and varnishes - Corrosion protection of steel structures by protective paint systems Part 3: Design considerations
SANS 12944-4	Paints and varnishes - Corrosion protection of steel structures by protective paint systems Part 4: Types of surface and surface preparation
SANS 12944-5	Paints and varnishes - Corrosion protection of steel structures by protective paint systems Part 5: Protective paint systems
SANS 12944-6	Paints and varnishes - Corrosion protection of steel structures by protective paint systems Part 6: Laboratory performance test methods
SANS 12944-7	Paints and varnishes - Corrosion protection of steel structures by protective paint systems Part 7: Execution and supervision of paint work
SANS 12944-8	Paints and varnishes - Corrosion protection of steel structures by protective paint systems Part 8: Development of specifications for new work and maintenance
SANS 14713-1	Zinc coatings - Guidelines and recommendations for the protection against corrosion of iron and steel in structures Part 1: General principles of design and corrosion resistance
SANS 14713-2	Zinc coatings - Guidelines and recommendations for the protection against corrosion of iron and steel in structures Part 2: Hot dip galvanizing
SANS 14713-3	Zinc coatings - Guidelines and recommendations for the protection against corrosion of iron and steel in structures Part 3: Sherardizing
SIS 055900	Swedish Code of Practice – Pictorial surface preparation standard for painted steel surfaces

Concrete works

The *Contractor* adheres to the latest issue of the listed standards/codes/publications. The *Contractor* notes that the list is not all-inclusive and does not relieve the *Contractor* from complying with all applicable codes.

Table 6: List of applicable standards for Concrete Works

Code	Description
Admixtures	
SANS 50934-1	Admixtures of concrete, mortar and grout, Part 1, Common requirements
SANS 50934-2	Admixtures of concrete, mortar and grout, Part 2, Concrete admixtures: definitions, requirements, conformity, marking and labelling
SANS 50934-3	Admixtures for concrete, mortar and grout, Part 3, Admixtures for masonry mortar - definitions, requirements, conformity and marking and labelling
SANS 50934-4	Admixtures for concrete, mortar and grout, Part 4, Admixtures for grout for prestressing tendons - definitions, requirements, conformity, marking and labelling
SANS 50934-5	Admixtures for concrete, mortar and grout, Part 5, Admixtures for sprayed concrete - definitions, requirements, conformity, marking and labelling
SANS 50934-6	Admixtures for concrete, mortar and grout, Part 6, Sampling, conformity control and evaluation of conformity
Aggregates	
SANS 195	Sampling of aggregates
SANS 197	Preparation of Test Samples of Aggregates
SANS 201	Sieve Analysis, Fines Content and Dust Content of Aggregates
SANS 202	Chloride Content of Aggregates
SANS 794	Aggregates of low density
SANS 1083	Aggregates from natural sources – Aggregates for concrete
SANS 1090	Aggregates from natural sources - Fine aggregates for plaster and mortar
SANS 3001-AG1	Civil engineering test methods. Part AG1, Particle size analysis of aggregates by sieving
SANS 3001-AG2	Civil engineering test methods. Part AG2, Determination of the average least dimension of aggregates by direct measurement
SANS 3001-AG3	Civil engineering test methods. Part AG3, Determination of the average least dimension of aggregates by computation
SANS 3001-AG4	Civil engineering test methods. Part AG4, Determination of the flakiness index of coarse aggregate
SANS 3001-AG5	Civil engineering test methods. Part AG5, Sand equivalent value of fine aggregates
SANS 3001-G10	Civil engineering test methods. Part AG10, ACV (aggregate crushing value) and 10% FACT (fines aggregate crushing test) values of coarse aggregates
SANS 3001-G12	Civil engineering test methods. Part AG12, Soundness of aggregates (magnesium sulphate method)
SANS 3001-G13	Civil engineering test methods. Part AG13, Determination of the soundness of mudrock aggregates
SANS 3001-G14	Civil engineering test methods. Part AG14, Determination of the ethylene glycol durability index for rock
SANS 3001-G15	Civil engineering test methods. Part AG15, Determination of rock durability using 10% FACT (fines aggregate crushing test) values after soaking in ethylene glycol
SANS 3001-G16	Civil engineering test methods. Part AG16, Determination of the durability mill index values for aggregates
SANS 3001-G23	Civil engineering test methods. Part AG23, Particle and relative densities of aggregates

Code	Description
SANS 5831	Presence of chlorides in aggregates
SANS 5832	Organic impurities in fine aggregates (limit test)
SANS 5833	Detection of sugar in fine aggregates
SANS 5834	Soluble deleterious impurities in fine aggregates (limits test)
SANS 5835	Estimation of the effect of fine aggregates on the water requirement of concrete
SANS 5836	Effect of fine and coarse aggregate on the shrinkage and expansion of cement: aggregate mixes (mortar prism method)
SANS 5837	Low density materials content of aggregates
SANS 5838	Sand equivalent value of fine aggregates
SANS 5840	Shell content of fine aggregate
SANS 5841	Aggregate crushing value of coarse aggregates
SANS 5842	FACT value (10% fines aggregate crushing value) of coarse aggregates
SANS 5844	Particle and relative densities of aggregates
SANS 5845	Bulk densities and voids content of aggregates
SANS 5846	Abrasion resistance of coarse aggregates (Los Angeles machine method)
SANS 5847	Flakiness index of course aggregates
SANS 5848	Polished-stone value of aggregates
SANS 5849	Total water-soluble salts content of fines in aggregates
SANS 5850-1	Sulphates content of fines in aggregates. Part 1, Water-soluble sulphates in fines in aggregates
SANS 5850-2	Sulphates content of fines in aggregates. Part 2, Acid-soluble sulphates in fines in aggregates
SANS 5851	Liquid limit of fines in aggregates for base-courses
SANS 5854	pH value of fines in aggregates for base-courses
SANS 5855	Free water content of aggregates
SANS 5856	Bulking of fine aggregates
SANS 6239	Aggregate impact value of coarse aggregate
SANS 6240	Electric conductivity of fine aggregate
SANS 6241	Particle size distribution of material of diameter smaller than 75 micron in fine aggregate (hydrometer method)
SANS 6242	Acid insolubility of aggregates
SANS 6243	Deleterious clay content of the fines in aggregate (methylene blue adsorption indicator test)
SANS 6244	Particles of diameter not exceeding 20micron and not exceeding 5micron and smaller, respectively, in fine aggregate (pipette method)
SANS 6245	Potential reactivity of aggregates with alkalis (accelerated mortar prism method)
SANS 6246	Treton impact value of aggregates
Cementitious Materials	
SANS 1745	Cementitious grouting capsules for use with tendon-based support systems
SANS 5748	Specific surface of cement
SANS 5754	Autoclave expansion of cement
SANS 6151	Free water content of Portland cementitious materials
SANS 6152	Available alkali content of cement extenders (complying with SANS 50197-1)
SANS 6154	Glass content of granulated metallurgical slag (transmitted-light microscopy method)
SANS 6155	Effect of extenders, used with cement, on the reduction of expansion caused by alkali-silica reaction (accelerated mortar prism method)
SANS 50196-1	Methods of testing cement. Part 1, Determination of strength

Code	Description
SANS 50196-2	Methods of testing cement. Part 2, Chemical analysis of cement
SANS 50196-3	Methods of testing cement. Part 3, Determination of setting times and soundness
SANS 50196-4	Methods of testing cement. Part 4, Quantitative determination of constituents
SANS 50196-5	Methods of testing cement. Part 5, Pozzolanicity test for pozzolanic cement
SANS 50196-6	Methods of testing cement. Part 6, Determination of fineness
SANS 50196-7	Methods of testing cement. Part 7, methods of taking and preparing samples of cement
SANS 50197-1	Cement. Part 1, Composition, specifications and conformity criteria for common cements
SANS 50197-2	Cement. Part 2. Conformity evaluation
SANS 50413-1	Masonry cement. Part 1, Composition, specifications and conformity criteria
SANS 50413-2	Masonry cement. Part 2, Test methods
SANS 50450-1	Fly ash for concrete. Part 1, Definition, specifications and conformity criteria
SANS 50450-2	Fly ash for concrete. Part 2, Conformity evaluation
SANS 50451-1	Method of testing fly ash. Part 1, Determination of free calcium oxide content
SANS 50451-2	Method of testing fly ash. Part 2, Determination of fineness by wet sieving
SANS 53263-1	Silica fume for concrete. Part 1, Definitions, requirements and conformity criteria
SANS 53263-2	Silica fume for concrete. Part 2, Conformity evaluation
SANS 55167-1	Ground granulated blast furnace slag for use in concrete, mortar and grout. Part 1, Definitions, specifications and conformity criteria.
SANS 55167-2	Ground granulated blast furnace slag for use in concrete, mortar and grout. Part 2, conformity evaluation
Concrete	
SANS 878	Ready-mixed concrete
SANS 5860	Concrete tests - Dimensions, tolerances and uses of cast test specimens
SANS 5861-1	Concrete tests - Mixing fresh concrete in the laboratory
SANS 5861-2	Concrete tests -Sampling of freshly mixed concrete
SANS 5861-3	Concrete tests - Making and curing of test specimens
SANS 5862-1	Concrete tests - Consistence of freshly mixed concrete - slump test
SANS 5862-2	Concrete tests - Consistence of freshly mixed concrete - flow test
SANS 5862-3	Concrete tests - Consistence of freshly mixed concrete - vebe test
SANS 5862-4	Concrete tests - Consistence of freshly mixed concrete. Part 4, Compacting factor and compaction index
SANS 5863	Concrete tests - compressive strength of hardened concrete
SANS 5864	Concrete tests - flexural strength of hardened concrete
SANS 5865	Concrete tests - the drilling, preparation, and testing for compressive strength of cores taken from hardened concrete
SANS 6085	Concrete tests - initial drying shrinkage and wetting expansion of concrete
SANS 6250	Concrete tests - density of compacted freshly mixed concrete
SANS 6251	Concrete tests - density of hardened concrete
SANS 6252	Concrete tests - air content of freshly mixed concrete - pressure method
SANS 6253	Concrete tests - tensile splitting strength of concrete
SANS 6254	Mortar tests - initial drying shrinkage and wetting expansion of mortar
SANS 6255	Mortar tests - compressive strength of mortar
SANS 50206	Concrete – Specification, performance, production and conformity
Design	
SANS 993	Modular co-ordination in building
SANS 10100-1	The structural use of concrete. Part 1, Design

Code	Description
SANS 10160	Basis of structural design and actions for buildings and industrial structures.
Construction	
SANS 2001 CC1	Construction works: Part CC1: Concrete works (structural)
SANS 2001 CC2	Construction works: Part CC2: Concrete works (minor works)
SANS 10100-2	The structural use of concrete. Part 2, Materials and execution of work
SANS 10109-1	Concrete floors. Part 1, Bases to concrete floors
SANS 10109-2	Concrete floors. Part 2, Finishes to concrete floors
SANS 10155	Accuracy in buildings
SANS 53670	Execution of concrete structures
SANS 55392	Sustainability in building construction: general principles
Reinforcement	
SANS 282	Bending dimensions and scheduling of steel reinforcement for concrete
SANS 920	Steel bars for concrete reinforcement
SANS 1024	Welded steel fabric for reinforcement of concrete
SANS 10144	Detailing of steel reinforcement for concrete
Water	
SANS 51008	Mixing of water for concrete – Specification for sampling, testing and assessing the suitability of water, including water recovered from processes in the concrete industry, as mixing water for concrete
Concrete and Related Products	
SANS 266	Gypsum plasterboard
SANS 470	Concrete poles for telephone, power and lighting purposes
SANS 508	Concrete retaining blocks
SANS 541	Precast concrete paving slabs
SANS 676	Reinforced concrete pressure pipes
SANS 677	Concrete non-pressure pipes
SANS 685	Fibre-cement sheets (flat and profiled)
SANS 803	Fibre-cement boards
SANS 819	Fibre-cement pipes, couplings and fittings for sewerage, drainage and low-pressure irrigation
SANS 927	Precast concrete kerbs, edgings and channels
SANS 975	Prestressed concrete pipes
SANS 986	Precast reinforced concrete culverts
SANS 1058	Concrete paving blocks
SANS 1215	Concrete masonry units
SANS 1223	Fibre-cement pressure pipes and couplings
SANS 1294	Precast concrete manhole sections and components
SANS 1372	Prefabricated concrete components for fences
SANS 1504	Pre-stressed concrete lintels
SANS 1879	Precast concrete suspended slabs
SANS 1882	Polymer concrete surface boxes, manhole and inspection covers, gully gratings and frames
SANS 50771-3	Specification for masonry units. Part 3, Aggregate concrete masonry unite (dense and lightweight aggregates)
SANS 50771-4	Specification for masonry units. Part 4, Autoclaved aerated concrete masonry units

Code	Description
SANS 10904	Fibre-cement corrugated sheets and fittings for roofing and cladding
Laboratory Practice and Equipment in General	
SANS 1649	Non-automatic self-indicating, semi-self-indicating and non-self-indicating weighing instruments with denominated verification scale intervals
SANS 2859-1	Sampling procedures for inspection by attributes. Part 1, Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection
SANS 3310-1	Test sieves - technical requirements and testing. Part 1, Test sieves of metal wire cloth
SANS 3310-2	Test sieves - Technical requirements and testing. Part 2, Test sieves of perforated metal plate
SANS 6150	Verification of compression testing machines for concrete: calibration of load scale
SANS 10378	General requirements for the competence of verification laboratories
SANS 17025	General requirements for the competence of testing and calibration laboratories
Other Standards	
SANS 53584	Products and systems for the protection and repair of concrete structures – Test methods – Determination of creep in compression for repair products
SANS 1200 G	Standardized specification for civil engineering construction Section G: Concrete (structural)

Site clearance

As part of site clearance, the *Contractor* adheres to the latest revision of the *Employer's* Execution of Site Preparation and Earthworks Standard, document number 240-57127953, SANS 2001 BS1: Site Clearance and SABS 2001 C: Site Clearance (Only Clause 8 – Measurement and Payment)

Earthworks

As part of Earthworks, the *Contractor* adheres to the latest revision of the, listed standards and references, but not limited to:

- 240-57127953 - *Employer's* Execution of Site Preparation and Earthworks Standard
- SANS 2001 BE1: Earthworks (General)
- SANS 1200 D: Earthworks (Only Clause 8 – Measurement and Payment)
- SANS 2001 DP1**: Earthworks for buried pipelines & prefabricated culverts**
- SANS 1921-5: Construction and management requirements for works contracts, Part 5: Earthworks activities which are to be performed by hand

Stormwater drainage

The following codes are adhered to but not limited to the following:

- SANS 2001 DP5**: Stormwater Drainage**
- SANS 677: Concrete non-pressure pipes
- SANS 1200 LE: Stormwater Drainage (Only Clause 8 – Measurement and Payment)

OTHER REQUIREMENTS FOR THE WORKS

Spares

The *Contractor* to submit a priced schedule or list of spare parts, which are recommended to be kept by the *Employer* for the long-term operation and maintenance of plant equipment and machinery. This shall detail the full particulars of the items as well as their serial numbers. The *Contractor* also submits Technical Data Sheets or Material Certificates of the mentioned spares.

Special Tools Requirements

The *Contractor* to identify and submit to the *Employer* a priced list of all special tools required for the operation and maintenance of the plant equipment and machinery. These shall include the following but not limited to:

- OEM specific tools/devices
- Tools required for on-going maintenance of the equipment

Configuration Management Requirements

The *Contractor* supplies a comprehensive configuration management program in accordance to ISO 10007 (2nd Edition) to ensure that plant structures, components etc conform to approved design requirements. In addition, the as-built *Works* shall be accurately reflected in selected documents and databases, including those for design, procurement, construction, operation, testing and training. The configuration program shall 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 plant.

Plant Codification

Plant Coding shall be undertaken by the *Contractor.* The KKS system shall be used for classifying and designating both plant and related documentation The *Contractor* complies with the requirements of the Technical documentation classification and designation standard [240-54179170]], Eskom Hybrid Coding Standard [240-131050729], publication KKS power plant classification (B105e) 5th Edition 2003 and the KKS Applications: Guideline and explanations A, B1-4 (B106e) etc. All maintainable plant shall be coded up to KKS breakdown level 3 (i.e., Mechanical, Electrical, C&I and Civil systems)). Omissions or deviations from the latter requirements shall not be permitted without approval from the *Employer*.

Detailed nameplates or label lists with the service legends, including the KKS Code shall be prepared by the *Contractor* and submitted to the *Employer* for review and acceptance before commencing manufacture of the labels. All maintainable plant equipment and components shall be labelled by the *Contractor*, including all pipework.

The *Contractor* shall use Eskom – specific interpretations of the KKS standards, which will be reviewed and agreed on after Contact Award. The following variations relating to 240-93576498 are noted.

- Breakdown level 3 component code -> not used in P&ID’s and PFUP’s, only used by control hardware supplier.

- Breakdown level 0: will be shown as a general remark on the P&ID not on the individual KKS
- number.
- F0-level is not used; FN level is free -> no general decoding system.

The *Contractor* shall code all plant within the scope of supply. KKS codes shall appear on all plant related documentation, drawings, lists and correspondence.

The *Contractor* shall be responsible for ensuring accuracy, completeness, and consistency of all plant and document designations.

Plant Labelling

New labels shall be provided for all plant, material and equipment provided as part of the Works. The *Contractor* manufactures and installs labels according to 240-71432150 - KKS Plant Labelling and Equipment Descriptions Standard.

Documentation Requirements

The *Contractor* ensures that the Technical Documents and Records Management Work Instruction, [240-76992014] is adhered to for all documentation requirements. The *Contractor* is responsible for the compilation and the supply of all documentation during the various project stages. The *Contractor* makes provision in their programme for the submission of design documentation. For consistency, it is important that all documents used within the project follow the same layout, style and formatting as described in the Technical Documents and Records Management Work Instruction. Documents such as QCP's, Method Statements etc. that impact the project works to be approved by the *Employer* at least 3 working days prior to commencement of *works*.

Each revision of a document or drawing shall be accompanied with a list of comments made by the *Employer* on previous revisions, if applicable. The responses/corrective actions taken by the*Contractor* to be recorded in a revision table contained in each drawing/document.

Documents and drawings to indicate the *Employer's* unique identification number as allocated by the *Employer*. The *Contractor* may also have his own internal document or drawing number on the document or drawing.

Document Identification

The *Contractor* shall ensure that documents have the following minimum attributes on the coverpage:

- Document title
- Document unique identification number (Eskom number)
- *Contractor* document number, if applicable
- Document status
- Revision number
- Document type
- Document revision table/history
- Page number on the footer
- Document author/authorizer

- Document originator

The following additional attributes are important for technical documents:

- Package/system name/sub-system name
- Unit number
- *Contractor* name
- Contract number
- Plant identification codes

Format and Layout of Documents

For consistency, it is important that all documents used within a specific domain follow the same layout, style, and formatting standard.

Layout and Typography

Every document should comply with the following font specifications:

- Font Colour: Black
- Main Headings Font Type: Arial, Bold, Capital Letters
- Main Heading Font Size: 12pt
- Subheadings Font Type: Arial, Bold, Title Case
- Subheadings Font Size: 11pt
- Body Font Type: Arial, Sentence Case i.e., only the first letter of the first word is a capitalletter.
- Body Text Font size: 11pt
- Line Spacing: 1.5 line spacing.
- Margins: Standard
- Alignment: Full justification to be used
- Paragraphing: One line skip between paragraphs
- Pagination: Centred page numbers (about 0.5 inches from bottom)
- Indentations: Standard tab for all paragraphs (about 0.4 to 0.5 inches)
-

Document Headers

The header should include the project name, document title, document number, revision numberand page number.

Naming of files

The *Consultant* complies with the Eskom standard for naming documentation files. The standard is as follows:

For documents that have an approval date and signature; (YYYYMMDD_DocType_DocumentTitle_UniqueIdentifier_Revision.FileExtention)

For documents that do not necessarily require the 'Approved Date' and 'Revision & Versioning', use the date of update: (YYYYMMDD_DocType_DocumentTitle_UniqueIdentifier_Revision.FileExtention)

Document Submissions

The *Contractor's* program to allow a minimum of 21 days for mailing, processing, and review of drawings and data by the *Employer*. All documents and records must be submitted and managed according to the Project/Plant Specific Technical Document and Records Management Procedure, 240-76992014 as well as the Generation (Gx) Projects Documentation Deliverable Requirements Specification,240-65459834. The *Employer* shall ensure that the Contractor is provided with the latest revisions of the mentioned documents.

Information Requirements

The *Employer* requires information and data from the *Contractor* for management and execution of the Contract as well as the operation, maintenance, and support of the *works*. The *Contractor* to supply all information required in terms of the Contract including all information necessary for:

a) Design reviews and interface management of the *works*,

b) Quality assurance and control,

c) Operations, maintenance, training etc.

The scope of supply of information from the *Contractor*, to include the following but not limited to:

Table 7: Typical Document Requirement List (As-built) (where applicable)

Document Group	Description of document type (includes information data sets)
General	Equipment arrangement drawings Piping & Instrument Diagrams (P&ID's) 3D model Equipment list Isometric Drawings Valve list Pipeline list Hanger list Equipment specifications & data sheets Drawings and data for all equipment and material Installation, Operation, and Maintenance (IOM) Manuals Spare parts list Factory Acceptance Test (FAT) report etc. Databooks

Document Group	Description of document type (includes information data sets)
Civils & Structures	Site layout Structural drawings Drainage layouts Foundation drawings Geotechnical report Survey report Design report
Construction	Transportability study/report (including heavy haul study) Site management plan (QA, Safety, Environmental etc.) Construction schedule Site storage requirements for major equipment Construction test records (hydrotest, concrete strength, pile integrity test, etc.) Maintenance records of all equipment while stored on site Constructability report Etc.
Commissioning	Commissioning schedule Commissioning procedures Performance test procedure Performance test reports Field test reports and certificates Etc.
Quality Assurance	Quality assurance manual Quality control plans Quality control reports Weld summary index Material traceability certificates Manufacturing test reports Manufacturing Non-Conformance Reports (NCR's)
Operations	Operating procedure Maintenance procedures and schedules Operating and maintenance manuals Etc.

Document Group	Description of document type (includes information data sets)
Logistic Support	Maintenance concept Plant maintenance documentation ISI plan/program Spare parts assessment Plant RAM analysis Equipment access and removal paths assessment Fault finding diagrams Etc.
Training	Training plan Training manuals and instructions Etc.
Safety & Protection	Fire hazard analysis Waste management plan Etc.
Design Analyses	Reliability model and analysis Transient / Transition Analysis Flow dynamics analysis Thermo-hydraulic analysis Pipe Stress Analysis Maintainability analysis FMECA / FMEA analysis HAZOP analysis 3D model interference checks Etc.

Document Group	Description of document type (includes information data sets)
Electrical	Motor list Electrical load list Circuit list Raceway list Single line diagram Protection schematic diagram Electrical load flow and fault studies report Cable block diagrams Cabling routing and cable racking layout diagrams Cable termination diagrams EMC and earthing standards report Earthing layout drawings Lighting layout drawings Design reports Etc.
C&I	Alarm and set-point schedule Instrument schedule Instrument data sheets Mechanical hook-up drawings Electrical hook-up drawings Cable Schedule Termination Schedules Junction Box GA and Internal Layout Junction Box and Instrument location drawings Instrument Stand GA Maintenance Manuals and procedures Operating and Control Philosophies Functional Logic diagrams Field device calibration certificates Level measurement installation report

In addition to the official documentation submittals listed in Appendix E the *Contractor* shall provide additional information for review and design coordination as requested by the *Employer* from time to time.

The *Contractor* shall use the *Employer's* SmartPlant Environment and all design tools as the delivery mechanism for all project data and document deliverables. The EDMS and design tools

shall be provided to the *Contractor* pre-configured based on *Employer's* data handover requirements. Any project data and document deliverables not generated from design tools provided by the *Employer* shall be supplied in a format specified by the *Employer*.

Drawings

The creation, issuing and control of all Engineering Drawings shall be in accordance to the latest revision of the Engineering Drawing Standard, 240-86973501 - to be supplied as part of the enquiry documents. Drawings issued to the *Employer* will be a minimum of one hardcopy and an electronic copy. The *Contractor* is required to submit drawings electronically in both native CADD format and PDF format. Drawings issued to the *Employer* may not be "Right Protected" or encrypted.

Project Deliverables

The *Contractor* shall be responsible for the handover of all *Works* associated with the contract. The handover submissions shall include but not limited to the following:

- Detailed design reports for entire *Works*. Report to be signed off by an ECSA Professionally Registered Engineer
- Approved construction drawings for the entire *Works* signed off by an ECSA Professionally Registered Engineer
- Construction quality assurance plans.
- Construction method statement and QCP/ITP
- Results and records of test works
- As-built drawings and all handover documentation is required to be submitted within 6 weeks of construction completion.
- PECs and/or CoCs for completed *Works* is required to be submitted within 6 weeks of construction completion
- Data sheets/material certificates
- Geotechnical investigation and survey reports
- All construction supervision related documentation as detailed in this scope document.

Apart from statutory data packages required, the *Contractor* also compiles and supplies a data package of the relevant drawings, test certificates etc. to the *Employer's* Representative for acceptance.

- 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
- Pile Integrity Test Results (if required)
- Pile Load Test Results (if required)
- Foundation Certificate
- Welding procedure specifications

- Welder qualifications
- Non-destructive weld test results
- Weld test certificates
- Steel grade certificates
- Bolt grade certificates
- Hydrostatic tests of pipes and tanks
- 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 DWG formats
- Structural Certificate signed by the *Contractor's* Professionally Registered Engineer confirming that structure has been constructed in accordance with the design.

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:
Project Kick-off Meeting	3 days Contract Award	Kusile Power Station	Employer, Contractor and Others
SHEQ Requirements Clarification Meeting	3 days after Kick – off meeting	Kusile Power Station	Employer, Contractor and Others
Execution Progress Meeting	Daily	Kusile Power Station	Employer, Contractor and Others
Overall contract progress and feedback	Weekly on Thursdays	Kusile Power Station	Employer and Contractor
Risk register and compensation events	Daily	Kusile Power Station	Employer, Contractor and Others
Other	as and when required		Employer, Contractor and Others

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

The Contractor shall submit all relevant and necessary documentation requested by the Employer and both electronic and hard copy versions of all required documentation. The Contractor shall prepare and submit operations and maintenance manual including as built documents.

To ensure clear communication and effective management of records, all documentation related to this project shall adhere to the following protocol:

1. Document Identification: Each document shall carry a unique alphanumeric identifier. This code will indicate the document source, recipient, and communication number, making the document easily traceable.

2. Document Format: All contractual communications must be in the form of properly compiled letters or forms attached to emails. Messages within the body of an email will not be considered formal communication. Documents should be formatted as PDFs unless otherwise specified.

3. Document Routing: Specific routing requirements must be adhered to. All contractual documents must be issued directly to the relevant party as stipulated in the ECC. The project manager will ensure the documentation is appropriately disseminated and acknowledged.

4. Record Keeping: All communications must be logged in a communication register maintained by the Contractor. The register will document the date, source, recipient, communication number, and a brief summary of the document content.

5. Revision Control: Any changes or revisions to the documents should be clearly marked and issued with a new revision number. All previous versions should be archived for reference.

6. Confidentiality: All documents should be treated as confidential and should not be shared outside the project team without appropriate authorization.

2.3 Health and safety risk management

A Safety, Health, Environment and Quality (SHEQ) specification is Kusile Power Station's minimum requirements detailing also constraints, which are required to be met for the specific contract and for the duration of the contract period by the Contractor.
The Contractor is expected to develop a SHEQ plan which meets these requirements as well
as relevant and other legal and other requirements applicable to the issued scope of work.
Kusile Power Station in no way assumes the contractor's legal responsibilities. The contractor is and remains accountable for the quality and the execution of his/her health and safety programme for his/her employees and appointed contractor employees.
This SHEQ specification reflects minimum requirements and should not be construed as all encompassing. The Contractor shall comply with (SHEQ) requirements contained in Annexure A of this Works Information.

The *Contractor* shall comply with the health and safety requirements contained in Annexure **A** to this Works Information.

2.4 Environmental constraints and management

A Safety, Health, Environment and Quality (SHEQ) specification is Kusile Power Station's minimum requirements detailing also constraints, which are required to be met for the specific contract and for the duration of the contract period by the Contractor.
The Contractor is expected to develop a SHEQ plan which meets these requirements as well
as relevant and other legal and other requirements applicable to the issued scope of work.
Kusile Power Station in no way assumes the contractor's legal responsibilities. The contractor is and remains accountable for the quality and the execution of his/her health and safety programme for his/her employees and appointed contractor employees.
This SHEQ specification reflects minimum requirements and should not be construed as all encompassing. The Contractor shall comply with (SHEQ) requirements contained in Annexure A of this Works Information

The *Contractor* shall comply with the environmental criteria and constraints stated in Annexure **A**

2.5 Quality assurance requirements

The quality requirements are as per ISO 9001 and Employer Quality Requirements as specified in the SHEQ specification in Annexure A.

This quality management philosophy is developed from the basis that suppliers produce quality products, supervisor oversees the process, checks quality but liability for quality remains with the Contractor. The Contractor submits a QMS as a returnable schedule and uses it for all phases of the Project. The QMS complies with the requirements of ISO 9001:2008 standard. The Contractor provides evidence of a fully implemented QMS as and when requested by the Project manager. The Project Manager may at his sole discretion carry out an audit on the Contractor, the Contractor's suppliers and Sub-Contractors

Quality control plans will be produced by the Contractor or manufacturer which will indicate the level of product quality control to be applied. The CQP must be aligned to, and reference ISO 10006 QMS, guidelines for quality plans and in compliance with the guideline in 240-105658000. The CQP will make reference to the Contractor's QMS Procedures to be used in this Contract. This plan will be reviewed by the Project Manager. The project team monitors that these plans are being implemented and that it is yielding the expected results through process and product verifications.

The Contractor shall comply with (SHEQ) requirements contained in Annexure A of this Works Information.

2.6 Programming constraints

The Contractor shall execute the Works per the submitted schedule or as agreed between the Contractor and the Employer. The Contractor shall notify the Employer timeously should there be any changes in the submitted programme. The Contractor shall also acquaint themselves with the work involved and verify all quantities, materials etc. necessary to undertake the Works, for proper programming and co-ordination.
Programme format – The Contractor to issue the programme using either MS Projects (soft copy) or Primavera (soft copy)
The program should be updated as per the changes on Outage listing

Programme is to be submitted as indicated in the Contract Data.

2.7 *Contractor*'s management, supervision and key people

The Contractor must submit an organogram one month after Contract Start Date, to the Project Manager, based on the Contractor's plan and their lines of authority / communication.

2.8 Invoicing and payment

The Z clauses make reference to invoicing procedures stated here in this Service Information. Also include a list of information which is to be shown on an invoice.

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 Eskom Holdings SOC Ltd and include on each invoice the following information:

- Name and address of the *Contractor* and the *Project Manager;*
- The contract number and title;
- *Contractor*'s VAT registration number;
- The *Employer*'s VAT registration number 4740101508;
- Description of service provided for each item invoiced based on the Price List;
- Total amount invoiced excluding VAT, the VAT and the invoiced amount including VAT;

The invoice is to be submitted to **invoiceseskomlocal@eskom.co.za** once confirmed with the payment certificate.

Add procedures for invoice submission and payment (e. g. electronic payment instructions)

2.9 Insurance provided by the *Employer*

As stated in the Contract Data

2.10 Contract change management

All changes to the Contract, such as Contractor management changes or Compensation events shall be communicated through standard NEC ECC 3 forms.

2.11 Provision of bonds and guarantees

Not applicable

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

Not applicable

2.13 Training workshops and technology transfer

Not Applicable

3 Engineering and the *Contractor*'s design

Employer to keep the designs after the contract lapse, after approval from the Employers side

3.1 *Employer*'s design

The contractor to provide design after the service completion

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

Contractor to provide Supports designs and Drawings as per the Scope of Work

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

All designs and specifications to be submitted to the Project Manager and approved by the Engineer of the Employer prior construction works commence.

"As built" drawings, compliance certificates, guarantees to be submitted to the Project Manager as part of handover before Completion of the works.

3.4 Other requirements of the *Contractor*'s design

Applicable as per the Scope of Work

3.5 Use of *Contractor*'s design

- Detailed drawings for fabrication and construction. Drawings shall be submitted in DWG/DGN and PDF formats.
- All submitted drawings to be signed by an applicable Professionally Registered Engineer.
- Construction/installation Specifications for the works including measurement and payment items

3.6 Design of Equipment

To be incorporated within the main design

3.7 Equipment required to be included in the *works*

As per the scope of work, Contractor to provide their own Equipment

3.8 As-built drawings, operating manuals and maintenance schedules

The Contractor is responsible to plan for the supply of the commissioning manual, maintenance manual, functional description, and operating manual of the system including safety procedures for operating and maintain the system. The Contractor shall provide P&ID, Piping drawings, and wiring drawings for the system.

The Contactor shall develop and submit as-built data and drawings of the completed Works upon handover. As-built drawings shall be submitted in PDF and DGN/DWG formats

4 Procurement

4.1 People

4.1.1 Minimum requirements of people employed on the Site

Minimum requirements of people employed
- All staff required to perform the activities within the works information
- All relevant personnel names and titles must be specified to the Service Manager
- All Contractors personnel specified in this contract as per 2.3 to be on site at all times
- All new staff to be appointed in writing.
- Contract Staff are not allowed to work on any other contract.
- All new staff to do induction training
- All replacements of staff will be in the same discipline (like an artisan with an artisan with proof of qualifications)
- All new staff to be approved by Service Manager before entering the site or commencing work
- All new staff must hand in all qualifications and relevant documentation to the Service Manager
- When changing personnel a new access to work form to be completed by the Contractor
- Only required specified approved amount of personnel to be allowed on site, pre-arrange with Service Manager

4.1.2 BBBEE and preferencing scheme

Specify constraints which *Contractor* must comply with after contract award in regard to any Broad Based Black Economic Empowerment (B-BBEE) or preferencing scheme measures.

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

Transport and PPE for General workers to be given to a local supplier to render the services

4.2 Subcontracting

4.2.1 Preferred subcontractors

Not Applicable

4.2.2 Subcontract documentation, and assessment of subcontract tenders

Not Applicable

4.2.3 Limitations on subcontracting

Not Applicable

4.2.4 Attendance on subcontractors

Not Applicable

4.3 Plant and Materials

4.3.1 Quality

Refer to Quality Requirements

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

- Water
- Ablution Facilities
- Electricity

4.3.3 *Contractor*'s procurement of Plant and Materials

Contractor to procure plant and material to fulfil the technical requirements for the works.

4.3.4 Spares and consumables

No spares required

4.4 Tests and inspections before delivery

To ensure the quality and performance of the work, the inspections of supports must be carried out before the delivery of Supports to the Working Areas. These procedures aim to mitigate risks and ensure that the project adheres to the agreed specifications and standards.

Inspection by the Employer's Engineer and Project Manager: The Employer's Engineer and Project Manager are to carry out a thorough inspection of the Supports prior to delivery.

This inspection will involve checking the physical condition of the Supports, its alignment with design specifications, and its readiness for installation. The contractor must facilitate this inspection, providing all necessary documentation and access.

4.5 Marking Plant and Materials outside the Working Areas

Not applicable

4.6 *Contractor*'s Equipment (including temporary works).

The Contractor to purchase all equipment required for the works.

4.7 Cataloguing requirements by the *Contractor*

The Contractor is required to submit technical specification of all components for cataloguing. The Employer will furnish the Contract with forms to complete according to Procurement Instruction Number 1 of 2018 – Incorporating Cataloguing into the Procurement Environment, Unique Identifier 240-1289988974 after Contract award for submission after completion of the works.

5 Construction

5.1 Temporary works, Site services & construction constraints

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

The Contractor is to inform the Project Manager of the request for access to Site prior to the date of reporting to Site.
The Contractor to report to the Kusile Power Station Security gate on arrival, to comply with all security requirements.

- Lifesaving rules to be adhered at all times
- All personnel must attend induction before working on site and must obtain gate permits via the Project Manager.
- Contractor to comply to the Eskom values and rules, e.g No taking Pictures without approval, no walking and texting
- Access is limited and controlled by Plant Safety Regulations requirements.
- No employee will be allowed to access the plant or to work without access permit issued.
- All personnel to work on the plant must be registered on the Worker's Register by the Responsible Person.
- Each personnel to have an Identification card at all times
- Unauthorized access to site is prohibited. The personnel are expected to be at their working site area at all times.
- No recruitment on site or at the main access gates or any Premises of the Employer is allowed.

- All activities to comply with the OSHACT and Regulations
- All activities on plant must be preceded by a plant risk assessment – Risk assessment as per the standard of the Employer, to be current at all times (Live Document)
- All work to be done according to the construction regulations at all times

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

Site restructuration on site to be shared after contract date.

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

The Contractor is responsible for management and administration of his people to comply with all the Employer's requirements for the duration of the contract.

Normal working hours: 07h00 to 16h30 (Monday to Thursday)
07h00 to 12h00 Fridays

The Contractor keeps records of his people working on the Affected Property
Time sheets to be controlled weekly and signed of by the Employer Supervisor.
No valuable assets of the Contractor to be left onsite without security approval.

5.1.4 Health and safety facilities on Site

Refer to Section 2.3

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

Refer to Section 2.4

5.1.6 Title to materials from demolition and excavation

Not applicable

5.1.7 Cooperating with and obtaining acceptance of Others

1) The Contractor will be required to work with Others with whom the Contractor may be required to share the Affected Property.
2) Requirements for liaison with and acceptance from statutory authorities or inspection agencies will be communicated when required

5.1.8 Publicity and progress photographs

The Contractor to Comply to Eskom rules of no Photography

5.1.9 *Contractor*'s Equipment

Contractor to declare their equipment's and tools

- Contractor's equipment (Cell phones with Camera's, Computers, Camera's etc.) to be and signed in at security.
- All test equipment must be calibrated and tested regularly and certificates must be handed in to the Service Manager for record keeping
- All equipment and tools needs to be marked and a list off all tools with the identification number to be provided to the Service Manager when entering site.
- All lost equipment and tools to be declared to the Service Manager and full details of incident.

5.1.10 Equipment provided by the *Employer*

The Contractor supplies equipment required for the works.

5.1.11 Site services and facilities

The Employer will provide the Contractor with the following services whilst doing work on the Affected Property

1. Water
2. Electricity
3. Ablution Facilities
4. Fire Protection equipment
5. Waste disposal Facilities
6. Other facilities e.g., Canteens for personal accounts are available on site.
7. The Employer shall provide a Contractor's employee with internet access for communication purposes.
8. Contractor shall provide everything else necessary for providing the Works.

5.1.12 Facilities provided by the *Contractor*

The Contractor is to provide for himself the following:
1. Vehicles
2. Site Establishment containers
3. Personal Protective Equipment (branded with the Contractor's name) as per safe work requirements.
4. Contractor shall provide everything else necessary for providing the works.

5.1.13 Existing premises, inspection of adjoining properties and checking work of Others

The contractor shall do inspections as per Scheduled Work Order and report al defects to the Employer's Supervisor / Employer

5.1.14 Survey control and setting out of the *works*

The Contractor is responsible for setting out of the works.

5.1.15 Excavations and associated water control

Excavation is not required

5.1.16 Underground services, other existing services, cable and pipe trenches and covers

Contractor to asses' area of works as report risks prior to works commence.

5.1.17 Control of noise, dust, water and waste

- All necessary and relevant PPE must be used at all time when entering or working on plant
- Risk assessments must be completed before commencing with any task to be current at all times (Live Document)
- All relevant procedures to be used at all times

5.1.18 Sequences of construction or installation

Sequence to be detailed by the Contractor in the submitted programme

5.1.19 Giving notice of work to be covered up

- The Supervisor to be notified within the notification period as per Contract Data
- The employer shall Issue notice as early as possible as per the ECC contract

5.1.20 Hook ups to existing works

Contractor to assess area of works and report hook ups prior to works commence. Hooking up on heights is a non-negotiable Lifesaving rule of Eskom. Kusile Power Station applies Zero Tolerance to non-compliance of this rule or any other Lifesaving rule. The same disciplinary process procedure will be followed when any of the Lifesaving rules have been breached

5.2 Completion, testing, commissioning and correction of Defects

5.2.1 Work to be done by the Completion Date

All work is to be done by the Completion Date.

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

Completion is when the Contractor has done all the work, which the Works Information states he is to do by the Completion Date and has corrected notified Defects, which would have prevented the Employer from using the works. The Site is handed back to the Employer in a condition acceptable to the Project Manager

5.2.3 Materials facilities and samples for tests and inspections

The Contractor shall be responsible for the testing of the Works. The Works shall be tested in accordance with the latest standards and procedures as outlined by the South African Bureau of Standards (SABS)/South African National Standards (SANS) as well as any other applicable and relevant standards and specifications.

5.2.4 Commissioning

Refer to the scope of works for commissioning works. Commissioning is performed with the involvement of the Employer and Others.

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

Contractor to issue procedures to the employer

5.2.6 Take over procedures

Takeover is at the same time as Completion.

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

The Project Manager arranges in time to allow the Contractor access to and use of a part of the works which has been taken over if needed to correct a Defect. After the works have been put into operation, the Employer may require the Contractor to undertake certain procedures before such access can be granted.

5.2.8 Performance tests after Completion

Upon the completion of the installation, the Contractor will be required to perform comprehensive performance tests on the Installed Supports to demonstrate that it operates correctly and meets all the requirements specified in the Contractor's Works Information. The performance tests should follow a well-defined procedure, and any deviations from the expected performance should be duly reported, with appropriate corrective measures taken.

The performance tests should assess the following aspects:

- Functionality: Confirm that all features of the GRP Supports operate as intended.
- Reliability: Determine the ability of the Supports to perform consistently over time.
- Compatibility: Ensure the Supports structure integrates seamlessly with the existing infrastructure

5.2.9 Training and technology transfer

N/A

5.2.10 Operational maintenance after Completion

The Employer will require the Contractor before the defects date to perform fault finding and repairs should there be a standing fault as a result of a defect as per notification of the Employer.

6 Plant and Materials standards and workmanship

6.1 Investigation, survey and Site clearance

Not applicable

6.2 Building works

Applicable as per Scope of Work

6.3 Civil engineering and structural works

Applicable as per Scope of Work

6.4 Electrical & mechanical engineering works

Applicable as per Scope of Work

6.5 Process control and IT works

Not applicable

6.6 Other [as required]

Fire Suppression and Protection Works

7 List of drawings

7.1 Drawings issued by the *Employer*

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

Note: List of Drawings and Standards

Table 4: List of Applicable Standards for Structural Steelwork

Code	Description
SANS 121	Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods
SANS 455	Covered electrodes for manual arc welding of carbon steels
SANS 517	Light Steel Frame Building
SANS 657	Steel tubes for non-pressure purposes
SANS 679	Zinc chromate primers for steel
SANS 681	Undercoats for paints
SANS 684	Structural steel paint
SANS 1273	Fasteners for roof and wall coverings in the form of sheeting
SANS 1465	Steel castings for general engineering applications
SANS 1700	Fasteners
SANS 1921-3	Construction and management requirements for works contracts, Part 3: Structural steelwork
SANS 2001-CS1	Construction works Part CS1: Structural steelwork
SANS 3834	Quality requirements or fusion welding of metallic materials
SANS 4042	Fasteners – Electroplated coatings
SANS 10044	Welding
SANS 10064	The preparation of steel surfaces for coating
SANS 10085	The design, erection, use and inspection of access scaffolding
SANS 10094	The use of high-strength friction grip bolts
SANS 10104	Hand railing and balustrading (safety aspects)
SANS 10120	Code of practice for use with standardised specifications for civil engineering construction and contract documents
SANS 10162	The structural use of steel
SANS 10177	Fire testing of materials, components and elements used in buildings
SANS 10237	Roof and side cladding
SANS 10400	The application of the National Building Regulations
SANS 10684	Fasteners – Hot dip galvanised coatings
SANS 14399	High strength structural bolting assemblies for preloading
SANS 14713	Protection against corrosion of iron and steel in structures – zinc and aluminium coatings – guidelines (ISO 14713)
SANS 15609	Specification and qualification of welding procedures for metallic materials – welding procedure specification
SANS 15614	Specification and qualification of welding procedures for metallic materials – welding procedure test
SANS 16961	Petroleum, petrochemical and natural gas industries – Internal coating and lining of steel storage tanks

Code	Description
SANS 23279	Non-destruction
SANS 50025	Hot rolled products of structural steels
SANS 50028	Flat products made of steels for pressure purposes
SANS 50219	Cold formed welded structural hollow sections of non-alloy and fine grain steels Part 1 – Technical delivery
EN 10210-1	Hot finished structural hollow sections of non-alloy and fine grain steels – Part 1: Technical delivery requirements
EN 10210-2	Hot finished structural hollow sections of non-alloy and fine grain structural steels – Part 2: Tolerances, dimensions and sectional properties
ANSI/AWS A5.1/A5.1M	Specification for carbon steel electrodes for shielded metal arc welding
ANSI/AWS A5.17/A5.17M	Specification for carbon steel electrodes and fluxes for submerged arc welding
ANSI/AWS A5.18/A5.18M	Specification for carbon steel electrodes and rods for gas shielded arc welding
ANSI/AWS A5.20	Specification for carbon steel electrodes for flux cored arc welding
ASTM A 6/A 6Mb	Standard specification for general requirements for rolled structural steel bars, plates, shapes and sheet piling
ANSI/AWS D1.1/D1.1M	Structural welding code – steel
BS 4-1	Structural steel sections – Part 1: Specification for hot-rolled sections
DIN 1026-1	Hot rolled steel channels – Part 1: Taper flange steel channels - dimensions, masses and sectional properties
EN 10024	Hot rolled taper flange I sections – Tolerances on shape and dimensions
EN 10025-2	Hot rolled products of structural steels – Part 2: Technical delivery conditions for non-alloy structural steels
EN 10034	Structural steel I and H sections – Tolerances on shape and dimensions
EN 10056-2	Structural steel equal and unequal leg angles – Part 2: Tolerances on shape and dimensions
ISO 8501-1	Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness – Part 1: Rust grades and reparation grades of uncoated steel substrates and of steel substrates after overall removal of precious coatings

Table 5: List of Applicable Standards for Structural Steelwork

Code	Description
34-1658	Distribution Standards – Part 0: Corrosion Protection Specification for New Indoor and Outdoor distribution Equipment, components, materials and structures manufactured from steel
240-106365693	Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings
ASTM E376	Measuring coating thickness by magnetic field or eddy current electromagnetic test methods
ASTM D4541	Standard method for pull-off strength of coatings using portable adhesion testers
ISO 12944	Paint and varnishes – Corrosion protection of steel structures by protective paint systems
ISO 4624	Paints and varnishes – Pull-off test for adhesion
ISO 4628	Paints and varnishes
ISO 8501-1	Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness – Part 1: Rust grades and preparation grades of

Code	Description
	uncoated steel substrates and of steel substrates after overall removal of previous coatings
ISO 8501-4	Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness – Part 4: Initial surface conditions, preparation grades and flash rust grades in connection with high-pressure water jetting.
ISO 8502-3	Preparation of steel substrates before application of paint and related products – Tests for the assessment of surface cleanliness-Part 3: Assessment of dust on steel surfaces prepared for painting (pressure sensitive tape method).
ISO 8503-4	Preparation of steel substrates before application of paint and related products – Surface roughness characteristics of blast cleaned steel substrates – Part 4: Method for the calibration of ISO surface profile comparators and for the determination of surface profile – stylus instrument procedure
ISO 8504	Preparation of steel substrates before application of paint and related products – Surface preparation methods
ISO 9001	Quality Management System
SANS 110	Sealing compounds for the building industry, two-component, polysulphide base
SANS 121	Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods
SABS 763	Hot-dip (galvanised) zinc coatings (other than on continuously zinc-coated sheet and wire)
SANS 1077	Sealing compounds for the building and construction industry, two-component, polyurethane-base
SANS 1091	National colour standard
SANS 1217	Internal and external organic coating protection for buried steel pipelines
SANS 1700-5-8	Fasteners Part 5: General requirements and mechanical properties Section 8: Mechanical properties of corrosion-resistant stainless-steel fasteners - Bolts, screws and studs
SANS 1700-5-9	Fasteners Part 5: General requirements and mechanical properties Section 9: Mechanical properties of corrosion-resistant stainless-steel fasteners - Nuts
SANS 1700-5-10	Fasteners Part 5: General requirements and mechanical properties Section 10: Mechanical properties of corrosion-resistant stainless-steel fasteners - Set screws and similar fasteners not under tensile stress
SANS 1700-5-18	Fasteners Part 5: General requirements and mechanical properties Section 18: Fasteners - Non-electrolytically applied zinc flake coatings
SANS 2063	Thermal spraying - Metallic and other inorganic coatings - Zinc, aluminium and their alloys
SANS 2808	Paints and varnishes – Determination of film thickness
SANS 5159	Adhesion of paint and varnish films (cross cut test)
SANS 5769	Cleanliness of blast cleaned surfaces for painting (assessed by freedom from dust and debris)
SANS 5772	Profile of blast cleaned surfaces for painting (determined by a micrometre profile gauge)
SANS 5870	Hardness of vulcanized rubbers of hardness 30 — 95 degrees
SANS 10064	The preparation of steel surfaces for coating
SANS 10104	Hand railing and balustrading (safety aspects)
SANS 10120-2 HC	Code of practice for use with standardized specifications for civil engineering construction and contract documents Part 2: Project specification Section HC: Corrosion protection of structural steelwork
SANS 10120-4 HC	Code of practice for use with standardized specifications for civil engineering construction and contract documents Part 4: Typical schedule of quantities Section HC: Corrosion protection of structural steelwork
SANS 10120-5 HC	Code of practice for use with standardized specifications for civil engineering construction and contract documents Part 5: Contract administration Section HC: Corrosion protection of structural steelwork
SANS 10121	Cathodic protection of buried and submerged structures

Code	Description
SANS 10140	Identification colour marking
SANS 10214	The design, fabrication and inspection of articles for hot-dip galvanising
SANS 12944-1	Paints and varnishes - Corrosion protection of steel structures by protective paint systems Part 1: General introduction
SANS 12944-2	Paints and varnishes - Corrosion protection of steel structures by protective paint systems Part 2: Classification of environments
SANS 12944-3	Paints and varnishes - Corrosion protection of steel structures by protective paint systems Part 3: Design considerations
SANS 12944-4	Paints and varnishes - Corrosion protection of steel structures by protective paint systems Part 4: Types of surface and surface preparation
SANS 12944-5	Paints and varnishes - Corrosion protection of steel structures by protective paint systems Part 5: Protective paint systems
SANS 12944-6	Paints and varnishes - Corrosion protection of steel structures by protective paint systems Part 6: Laboratory performance test methods
SANS 12944-7	Paints and varnishes - Corrosion protection of steel structures by protective paint systems Part 7: Execution and supervision of paint work
SANS 12944-8	Paints and varnishes - Corrosion protection of steel structures by protective paint systems Part 8: Development of specifications for new work and maintenance
SANS 14713-1	Zinc coatings - Guidelines and recommendations for the protection against corrosion of iron and steel in structures Part 1: General principles of design and corrosion resistance
SANS 14713-2	Zinc coatings - Guidelines and recommendations for the protection against corrosion of iron and steel in structures Part 2: Hot dip galvanizing
SANS 14713-3	Zinc coatings - Guidelines and recommendations for the protection against corrosion of iron and steel in structures Part 3: Sherardizing
SIS 055900	Swedish Code of Practice – Pictorial surface preparation standard for painted steel surfaces

Table 6: List of applicable standards for Concrete Works

Code	Description
Admixtures	
SANS 50934-1	Admixtures of concrete, mortar and grout, Part 1, Common requirements
SANS 50934-2	Admixtures of concrete, mortar and grout, Part 2, Concrete admixtures: definitions, requirements, conformity, marking and labelling
SANS 50934-3	Admixtures for concrete, mortar and grout, Part 3, Admixtures for masonry mortar - definitions, requirements, conformity and marking and labelling
SANS 50934-4	Admixtures for concrete, mortar and grout, Part 4, Admixtures for grout for prestressing tendons - definitions, requirements, conformity, marking and labelling
SANS 50934-5	Admixtures for concrete, mortar and grout, Part 5, Admixtures for sprayed concrete - definitions, requirements, conformity, marking and labelling
SANS 50934-6	Admixtures for concrete, mortar and grout, Part 6, Sampling, conformity control and evaluation of conformity
Aggregates	
SANS 195	Sampling of aggregates
SANS 197	Preparation of Test Samples of Aggregates
SANS 201	Sieve Analysis, Fines Content and Dust Content of Aggregates
SANS 202	Chloride Content of Aggregates
SANS 794	Aggregates of low density
SANS 1083	Aggregates from natural sources – Aggregates for concrete

Code	Description
SANS 1090	Aggregates from natural sources - Fine aggregates for plaster and mortar
SANS 3001-AG1	Civil engineering test methods. Part AG1, Particle size analysis of aggregates by sieving
SANS 3001-AG2	Civil engineering test methods. Part AG2, Determination of the average least dimension of aggregates by direct measurement
SANS 3001-AG3	Civil engineering test methods. Part AG3, Determination of the average least dimension of aggregates by computation
SANS 3001-AG4	Civil engineering test methods. Part AG4, Determination of the flakiness index of coarse aggregate
SANS 3001-AG5	Civil engineering test methods. Part AG5, Sand equivalent value of fine aggregates
SANS 3001-G10	Civil engineering test methods. Part AG10, ACV (aggregate crushing value) and 10% FACT (fines aggregate crushing test) values of coarse aggregates
SANS 3001-G12	Civil engineering test methods. Part AG12, Soundness of aggregates (magnesium sulphate method)
SANS 3001-G13	Civil engineering test methods. Part AG13, Determination of the soundness of mudrock aggregates
SANS 3001-G14	Civil engineering test methods. Part AG14, Determination of the ethylene glycol durability index for rock
SANS 3001-G15	Civil engineering test methods. Part AG15, Determination of rock durability using 10% FACT (fines aggregate crushing test) values after soaking in ethylene glycol
SANS 3001-G16	Civil engineering test methods. Part AG16, Determination of the durability mill index values for aggregates
SANS 3001-G23	Civil engineering test methods. Part AG23, Particle and relative densities of aggregates
SANS 5831	Presence of chlorides in aggregates
SANS 5832	Organic impurities in fine aggregates (limit test)
SANS 5833	Detection of sugar in fine aggregates
SANS 5834	Soluble deleterious impurities in fine aggregates (limits test)
SANS 5835	Estimation of the effect of fine aggregates on the water requirement of concrete
SANS 5836	Effect of fine and coarse aggregate on the shrinkage and expansion of cement: aggregate mixes (mortar prism method)
SANS 5837	Low density materials content of aggregates
SANS 5838	Sand equivalent value of fine aggregates
SANS 5840	Shell content of fine aggregate
SANS 5841	Aggregate crushing value of coarse aggregates
SANS 5842	FACT value (10% fines aggregate crushing value) of coarse aggregates
SANS 5844	Particle and relative densities of aggregates
SANS 5845	Bulk densities and voids content of aggregates
SANS 5846	Abrasion resistance of coarse aggregates (Los Angeles machine method)
SANS 5847	Flakiness index of course aggregates
SANS 5848	Polished-stone value of aggregates
SANS 5849	Total water-soluble salts content of fines in aggregates
SANS 5850-1	Sulphates content of fines in aggregates. Part 1, Water-soluble sulphates in fines in aggregates
SANS 5850-2	Sulphates content of fines in aggregates. Part 2, Acid-soluble sulphates in fines in aggregates
SANS 5851	Liquid limit of fines in aggregates for base-courses
SANS 5854	pH value of fines in aggregates for base-courses
SANS 5855	Free water content of aggregates
SANS 5856	Bulking of fine aggregates

Code	Description
SANS 6239	Aggregate impact value of coarse aggregate
SANS 6240	Electric conductivity of fine aggregate
SANS 6241	Particle size distribution of material of diameter smaller than 75 micron in fine aggregate (hydrometer method)
SANS 6242	Acid insolubility of aggregates
SANS 6243	Deleterious clay content of the fines in aggregate (methylene blue adsorption indicator test)
SANS 6244	Particles of diameter not exceeding 20micron and not exceeding 5micron and smaller, respectively, in fine aggregate (pipette method)
SANS 6245	Potential reactivity of aggregates with alkalis (accelerated mortar prism method)
SANS 6246	Treton impact value of aggregates
Cementitious Materials	
SANS 1745	Cementitious grouting capsules for use with tendon-based support systems
SANS 5748	Specific surface of cement
SANS 5754	Autoclave expansion of cement
SANS 6151	Free water content of Portland cementitious materials
SANS 6152	Available alkali content of cement extenders (complying with SANS 50197-1)
SANS 6154	Glass content of granulated metallurgical slag (transmitted-light microscopy method)
SANS 6155	Effect of extenders, used with cement, on the reduction of expansion caused by alkali-silica reaction (accelerated mortar prism method)
SANS 50196-1	Methods of testing cement. Part 1, Determination of strength
SANS 50196-2	Methods of testing cement. Part 2, Chemical analysis of cement
SANS 50196-3	Methods of testing cement. Part 3, Determination of setting times and soundness
SANS 50196-4	Methods of testing cement. Part 4, Quantitative determination of constituents
SANS 50196-5	Methods of testing cement. Part 5, Pozzolanicity test for pozzolanic cement
SANS 50196-6	Methods of testing cement. Part 6, Determination of fineness
SANS 50196-7	Methods of testing cement. Part 7, methods of taking and preparing samples of cement
SANS 50197-1	Cement. Part 1, Composition, specifications and conformity criteria for common cements
SANS 50197-2	Cement. Part 2. Conformity evaluation
SANS 50413-1	Masonry cement. Part 1, Composition, specifications and conformity criteria
SANS 50413-2	Masonry cement. Part 2, Test methods
SANS 50450-1	Fly ash for concrete. Part 1, Definition, specifications and conformity criteria
SANS 50450-2	Fly ash for concrete. Part 2, Conformity evaluation
SANS 50451-1	Method of testing fly ash. Part 1, Determination of free calcium oxide content
SANS 50451-2	Method of testing fly ash. Part 2, Determination of fineness by wet sieving
SANS 53263-1	Silica fume for concrete. Part 1, Definitions, requirements and conformity criteria
SANS 53263-2	Silica fume for concrete. Part 2, Conformity evaluation
SANS 55167-1	Ground granulated blast furnace slag for use in concrete, mortar and grout. Part 1, Definitions, specifications and conformity criteria.
SANS 55167-2	Ground granulated blast furnace slag for use in concrete, mortar and grout. Part 2, conformity evaluation
Concrete	
SANS 878	Ready-mixed concrete
SANS 5860	Concrete tests - Dimensions, tolerances and uses of cast test specimens
SANS 5861-1	Concrete tests - Mixing fresh concrete in the laboratory
SANS 5861-2	Concrete tests -Sampling of freshly mixed concrete
SANS 5861-3	Concrete tests - Making and curing of test specimens

Code	Description
SANS 5862-1	Concrete tests - Consistence of freshly mixed concrete - slump test
SANS 5862-2	Concrete tests - Consistence of freshly mixed concrete - flow test
SANS 5862-3	Concrete tests - Consistence of freshly mixed concrete - vebe test
SANS 5862-4	Concrete tests - Consistence of freshly mixed concrete. Part 4, Compacting factor and compaction index
SANS 5863	Concrete tests - compressive strength of hardened concrete
SANS 5864	Concrete tests - flexural strength of hardened concrete
SANS 5865	Concrete tests - the drilling, preparation, and testing for compressive strength of cores taken from hardened concrete
SANS 6085	Concrete tests - initial drying shrinkage and wetting expansion of concrete
SANS 6250	Concrete tests - density of compacted freshly mixed concrete
SANS 6251	Concrete tests - density of hardened concrete
SANS 6252	Concrete tests - air content of freshly mixed concrete - pressure method
SANS 6253	Concrete tests - tensile splitting strength of concrete
SANS 6254	Mortar tests - initial drying shrinkage and wetting expansion of mortar
SANS 6255	Mortar tests - compressive strength of mortar
SANS 50206	Concrete – Specification, performance, production and conformity
Design	
SANS 993	Modular co-ordination in building
SANS 10100-1	The structural use of concrete. Part 1, Design
SANS 10160	Basis of structural design and actions for buildings and industrial structures.
Construction	
SANS 2001 CC1	Construction works: Part CC1: Concrete works (structural)
SANS 2001 CC2	Construction works: Part CC2: Concrete works (minor works)
SANS 10100-2	The structural use of concrete. Part 2, Materials and execution of work
SANS 10109-1	Concrete floors. Part 1, Bases to concrete floors
SANS 10109-2	Concrete floors. Part 2, Finishes to concrete floors
SANS 10155	Accuracy in buildings
SANS 53670	Execution of concrete structures
SANS 55392	Sustainability in building construction: general principles
Reinforcement	
SANS 282	Bending dimensions and scheduling of steel reinforcement for concrete
SANS 920	Steel bars for concrete reinforcement
SANS 1024	Welded steel fabric for reinforcement of concrete
SANS 10144	Detailing of steel reinforcement for concrete
Water	
SANS 51008	Mixing of water for concrete – Specification for sampling, testing and assessing the suitability of water, including water recovered from processes in the concrete industry, as mixing water for concrete
Concrete and Related Products	
SANS 266	Gypsum plasterboard
SANS 470	Concrete poles for telephone, power and lighting purposes
SANS 508	Concrete retaining blocks
SANS 541	Precast concrete paving slabs
SANS 676	Reinforced concrete pressure pipes

Code	Description
SANS 677	Concrete non-pressure pipes
SANS 685	Fibre-cement sheets (flat and profiled)
SANS 803	Fibre-cement boards
SANS 819	Fibre-cement pipes, couplings and fittings for sewerage, drainage and low-pressure irrigation
SANS 927	Precast concrete kerbs, edgings and channels
SANS 975	Prestressed concrete pipes
SANS 986	Precast reinforced concrete culverts
SANS 1058	Concrete paving blocks
SANS 1215	Concrete masonry units
SANS 1223	Fibre-cement pressure pipes and couplings
SANS 1294	Precast concrete manhole sections and components
SANS 1372	Prefabricated concrete components for fences
SANS 1504	Pre-stressed concrete lintels
SANS 1879	Precast concrete suspended slabs
SANS 1882	Polymer concrete surface boxes, manhole and inspection covers, gully gratings and frames
SANS 50771-3	Specification for masonry units. Part 3, Aggregate concrete masonry unite (dense and lightweight aggregates)
SANS 50771-4	Specification for masonry units. Part 4, Autoclaved aerated concrete masonry units
SANS 10904	Fibre-cement corrugated sheets and fittings for roofing and cladding
Laboratory Practice and Equipment in General	
SANS 1649	Non-automatic self-indicating, semi-self-indicating and non-self-indicating weighing instruments with denominated verification scale intervals
SANS 2859-1	Sampling procedures for inspection by attributes. Part 1, Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection
SANS 3310-1	Test sieves - technical requirements and testing. Part 1, Test sieves of metal wire cloth
SANS 3310-2	Test sieves - Technical requirements and testing. Part 2, Test sieves of perforated metal plate
SANS 6150	Verification of compression testing machines for concrete: calibration of load scale
SANS 10378	General requirements for the competence of verification laboratories
SANS 17025	General requirements for the competence of testing and calibration laboratories
Other Standards	
SANS 53584	Products and systems for the protection and repair of concrete structures – Test methods – Determination of creep in compression for repair products
SANS 1200 G	Standardized specification for civil engineering construction Section G: Concrete (structural)

C3.2 *CONTRACTOR*'S WORKS INFORMATION

- The Contractor shall execute the Works per the submitted schedule or as agreed between the Contractor and the Employer. The Contractor shall notify the Employer timeously should there be any changes in the submitted programme. The Contractor shall also acquaint themselves with the work involved and verify all quantities, materials etc. necessary to undertake the Works, for proper programming and co-ordination.
- Programme format – The Contractor to issue the programme using either MS Projects (soft copy) or Primavera (soft copy)
- The program should be updated as per the changes on Outage listing
- Programme is to be submitted as indicated in the Contract Data.

PART 4: SITE INFORMATION

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

PART 4: SITE INFORMATION

Core clause 11.2(16) states

"Site Information is information which

- describes the Site and its surroundings and
- is in the documents which the Contract Data states it is in."

In Contract Data, reference has been made to this Part 4 of the contract for the location of Site Information.

1. General description

Site	:	Kusile Power Station
Regional Authority	:	Emalahleni Local Municipality, Mpumalanga Province
Nearest Towns	:	Emalahleni – 42km north east of power station Bronkhorstspruit – 41km south of power station Delmas – 45km north of power station There are informal settlements within a 10 km radius of the power station.
Infrastructure	:	Kusile Power Station is situated approximately 3km from the N4 highway and is connected to it by means of a tarred road. There is also a secondary tarred road connecting the site with the R545 and D686.
Latitude & longitude	:	
Landowner	:	Portions of Horingkraans Farm
River catchment	:	Wilge River
Regional Climate		Kusile Power Station is situated in the Mpumalanga Province on the Highveld in the western part of Mpumalanga province on the escarpment, at an average height of 1551 m above sea level. The winters are generally dry and cold with regular frost and temperatures varying between -7ºC and 23ºC. The summers are mild with most of the rainfall occurring during this season. Temperatures vary between 12º & 32º C.
Wind direction		Data from the Emalahleni weather station shows that Kusile Power Station is sited in such a way that for most of the year (291 days) the wind direction is from the power station in a direction that is North West.
Rainfall		Based on information recorded at the Emalahleni weather station, the average annual rainfall for the Emalahleni area is approximately 691 mm. (Weather Bureau, Pretoria).

2. Existing buildings, structures, and plant & machinery on the Site

- The Contractor will be required to work with others with whom the Contractor may be required to share the Affected Property.
- Requirements for liaison with and acceptance from statutory authorities or inspection agencies will be communicated when required
- Any risk arises due to buildings, structures, and plant & machinery on the Site to be communicated with the project manager prior to work commencement.

3. Subsoil information

Not Applicable

4. Hidden services

Not Applicable

5. Other reports and publicly available information

Not Applicable