NEC3 Engineering & Construction Contract

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

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

for **AUTOMATIC GENERATION CONTROL (AGC), AND GENERATOR PLANT REMOTE TERMINAL UNIT (RTU) UPGRADE AT ARNOT POWER STATION FOR A PERIOD OF 18 MONTHS**

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

Part C1: Agreements & Contract Data

Contents:

C1.2 ECC3 Contract Data

Part one - Data provided by the *Employer*

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

	Fax No.	
	e-mail	
11.2(13)	The *works* are	The Scope of Work covers the following: 1. The Design, Engineering, Manufacture, Assembly, Testing and Inspection, Packing and Delivery to Site of the following: • AGC RTU, • Generator Plant A RTU, and • Generator Plant B RTUs. 2. The obsolete RTUs are replaced with the latest intelligent controllers that are compatible with the following: • Existing Hitachi Energy Micro SCADA, • Existing BME System at the HV Yard which interfaces to the RTU, • Existing ABB P14 DCS. 3. Provision of software and hardware interfaces of the AGC RTU to the following: • ABB P14 DCS, • Hitachi Energy Micro SCADA, • Generator Plant A RTU, • Generator Plant B RTU, and • The BME system at the HV Yard. 4. Provision of software and hardware interface of the Generator Plant A and B RTUs to the Hitachi Energy Micro SCADA.
11.2(14)	The following matters will be included in the Risk Register	• **Matters notified as early warnings,** **Decisions resulting from risk reduction meetings.**
11.2(15)	The *boundaries of the site* are	**the Site areas associated with the *works*, within the boundaries of Access Control Point at Arnot Power Station**
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	• **2 (two) weeks during non-outage periods** • **24 hours during outage** **Periods for review as stated in the Works Information.**
2	**The *Contractor's* main**	**Data required by this section of the core clauses**

	responsibilities	**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	**Eighteen (18) Month**		
11.2(9)	The *key date*s and the *condition*s to be met are:	***Condition* to be met**		***key date***
		1	***Contract* placement**	•
		2	***Contractor* submits an acceptable scheme design to the *Project Manager* for review.**	**As per first Accepted Programme**
		3	***Contractor* submits an acceptable installation design to the *Project Manager* for review.**	**As per first Accepted Programme**
		4	**Materials on Site**	**As per first Accepted Programme**
		5	**Issue of an acceptable project management manual, project quality plan,**	**As per first Accepted Programme**
		6	**Project risk assessment to the *Project Manager* for acceptance**	**As per first Accepted Programme**
		7	**Start Implementation**	**As per first Accepted Programme**
30.1	The *access dates* are:	**Part of the Site**		**Date**
		1	**Arnot Powerstation**	**The *starting date***
		2	**The Site areas associated with the *works***	**The *starting date***
		3	**Arnot Powerstation**	**The *starting date***
31.1	The *Contractor* is to submit a first programme for acceptance within	**Two (2) weeks of the Contract Date.**		
31.2	The *starting date* is	•		
32.2	The *Contractor* submits revised programmes at intervals no longer than	**Two (2) weeks.**		
35.1	The *Employer* is not willing to take over			

	the *works* before the Completion Date.	
4	**Testing and Defects**	
42.2	The *defects date* is	**Fifty-two (52) weeks after Completion of the whole of the *works*.** **The *works* or particular parts thereof which are repaired or replaced shall be re-warranted against Defects for a further period of eighteen (18) months from the date such repaired *works* or replaced parts are installed whichever is the earlier.**
43.2	The *defect correction period* is	**Defects correction period is One week** **The period for repair of the Defect shall be determined by the nature of the Defect and shall be such period as is reasonable in all the circumstances. The defective part will be inspected by the *Contractor* and a decision made as to whether it can be repaired, or a replacement part ordered. The *Contractor* is responsible for providing working access to the Defect, including disassembly, opening up and closing of plant and equipment and *works*, except if it was not in the scope of this contract.** **If the Defect is of such a nature that it cannot reasonably be repaired in one week, the *Contractor* promptly notifies the *Project Manager* and submits a plan for correcting the Defect. The *Contractor* and *Project Manager* agree on a revised *defect correction period.* If no agreement is reached within one (1) week of the notification of the Defect, Core Clause 45.1 may be invoked.**
5	**Payment**	
50.1	The *assessment interval* is	**Between the 25th day of each successive month.**
51.1	The *currency of this contract* is the	**ZAR (South African Rand).**
51.2	The period within which payments are made is	**30 days after the receipt of correct and undisputed tax invoice** **ATTENTION: Eskom's standard policy on payment term for all contracts valued above R50 000 000.00 (Fifty Million Rand), including VAT, is 60 days. Bidders are requested to bear this payment term in mind when submitting bids and concluding contracts.**
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:	**Arnot Powerstation**
	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	**Arnot Powerstation**
	The *weather data* are the records of past *weather measurements* for each calendar month which were recorded at:	**Arnot Powerstation**
	and which are available from:	**the South African Weather Bureau and included in Annexure A to this Contract Data provided by the *Employer***
60.1(13)	Assumed values for the ten-year return *weather data* for each *weather measurement* for each calendar month are:	**As stated in Annexure A to this Contract Data provided by the *Employer*.**
7	**Title**	**There is no reference to Contract Data in this section of the core clauses and terms in italics used in this section are identified elsewhere in this Contract Data.**
8	**Risks and insurance**	

80.1	These are additional *Employer*'s risks	**The Employer's additional risks shall be as set out in the Risk Register.**
9	**Termination**	**There is no reference to Contract Data in this section of the core clauses and terms in italics used in this section are identified elsewhere in this Contract Data.**
10	**Data for main Option clause**	
A	**Priced contract with activity schedule**	**There is no reference to Contract Data in this Option and terms in italics are identified elsewhere in this Contract Data.**
11	**Data for Option W1**	
W1.1	The *Adjudicator* is	**the person selected from the ICE-SA Division (or its successor body) of the South African Institution of Civil Engineering Panel of Adjudicators by the Party intending to refer a dispute to him. (see www.ice-sa.org.za). If the Parties do not agree on an Adjudicator the Adjudicator will be appointed by the Arbitration Foundation of Southern Africa (AFSA).**
	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**	
X1	**Price adjustment for inflation**	
X1.1(a)	The *base date* for indices is	**Base date (One month after ITT/RFQ closing or to be agreed upon**

X1.1(c)	The proportions used to calculate the Price Adjustment Factor are:	**proportion**	**linked to index for**	**Index prepared by**
		15%	**Fixed**	**Fixed Portion**
		40%	**Labour**	**SEIFSA Table C-3(Actual Labour Cost)**
		35%	**Material**	**SEIFSA Table G (Mechanical/Engineering)**
		10%	**Transport**	**SEIFSA Table L-2 (Fuel Index)**
	Total	**100%**		
X2	**Changes in the law**	**There is no reference to Contract Data in this Option and terms in italics are identified elsewhere in this Contract Data.**		
X4	**Parent company guarantee**	**There is no reference to Contract Data in this Option and terms in italics are identified elsewhere in this Contract Data.**		
X7	**Delay damages (but not if Option X5 is also used)**	**20% of the contract Value**		
X7.1	Delay damages for Completion of the whole of the *works* are	**0.2% of the Price of the delayed item per completed week of delay up to a limit of 10% of the Price of the delayed item and cumulatively up to a limit of 10% of the total of the Prices of each Section. The payment of Liquidated Damages for delay shall be the Contractor's sole and exclusive liability for delay and shall not exceed, in total, an amount equal to 10% of the total of the Prices Should the Completion Date for all of the works be achieved after the Contractor has already paid liquidated damages in respect of a specific Section, the Contractor shall be entitled to recover the Liquidated Damages so paid in recognition of the overall Completion Date for all of the works having been so achieved**		
X16	**Retention (not used with Option F)**			
X16.1	The *retention free amount* is	**R0.0**		
	The *retention percentage* is	**5% of the contract Amount**		
X18	**Limitation of liability**			
X18.1	The *Contractor*'s liability to the *Employer* for indirect or consequential loss is limited to:	**R0.0 (zero Rand)**		
X18.2	For any one event, the *Contractor*'s liability to the *Employer* for loss of or damage to the *Employer*'s property is limited to:	**the amount of the deductibles relevant to the event**		

X18.3	The *Contractor*'s liability for Defects due to his design which are not listed on the Defects Certificate is limited to	**The greater of** • **the total of the Prices at the Contract Date and** • **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) Two (2) 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	**Change of Broad Based Black Economic Empowerment (B-BBEE) status**
Z3.1	Where a change in the *Contractor's* legal status, ownership or any other change to his business composition or business dealings results in a change to the *Contractor*'s B-BBEE status, the *Contractor* notifies the *Employer* within seven days of the change.
Z3.2	The *Contractor* is required to submit an updated verification certificate and necessary supporting documentation confirming the change in his B-BBEE status to the *Project Manager* within thirty days of the notification or as otherwise instructed by the *Project Manager*.
Z3.3	Where, as a result, the *Contractor's* B-BBEE status has decreased since the Contract Date the *Employer* may either re-negotiate this contract or alternatively, terminate the *Contractor*'s obligation to Provide the Works.
Z3.4	Failure by the *Contractor* to notify the *Employer* of a change in its B-BBEE status may constitute a reason for termination. If the *Employer* terminates in terms of this clause, the procedures on termination are P1, P2 and P3 as stated in clause 92, and the amount due is A1 and A3 as stated in clause 93.
Z4	**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	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*.
Z4.3	In the event that the *Contractor* is, at any time, required by law to disclose any such information which is required to be kept confidential, the *Contractor*, to the extent permitted by law prior to disclosure, notifies the *Employer* so that an appropriate protection order and/or any other action can be taken if possible, prior to any disclosure. In the event that such protective order is not, or cannot, be obtained, then the *Contractor* may disclose that portion of the information which it is required to be disclosed by law and uses reasonable efforts to obtain assurances that confidential treatment will be afforded to the information so disclosed.
Z4.4	The taking of images (whether photographs, video footage or otherwise) of the *works* or any

	portion thereof, in the course of Providing the Works and after Completion, requires the prior written consent of the *Project Manager*. All rights in and to all such images vests exclusively in the *Employer*.
Z4.5	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	<u>Loss of or damage to property</u> <u>*Employer*'s property</u> 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 <u>Other property</u> The replacement cost

	Bodily injury to or death of a person The amount required by applicable law
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 applicable 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.

Annexure A: One-in-ten-year-return *weather data* obtained from SA Weather Bureau for [weather station]

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

	Weather measurement				
Month	Cumulative rainfall (mm)	Number of days with rain more than 10mm	Number of days with min air temp < 0 deg.C	Number of days with snow lying at 08:00 CAT	[Other measurements if applicable]
January	**[●]**	**[●]**	**[●]**	**[●]**	
February	**[●]**	**[●]**	**[●]**	**[●]**	
March	**[●]**	**[●]**	**[●]**	**[●]**	
April	**[●]**	**[●]**	**[●]**	**[●]**	
May	**[●]**	**[●]**	**[●]**	**[●]**	
June	**[●]**	**[●]**	**[●]**	**[●]**	
July	**[●]**	**[●]**	**[●]**	**[●]**	
August	**[●]**	**[●]**	**[●]**	**[●]**	
September	**[●]**	**[●]**	**[●]**	**[●]**	
October	**[●]**	**[●]**	**[●]**	**[●]**	
November	**[●]**	**[●]**	**[●]**	**[●]**	
December	**[●]**	**[●]**	**[●]**	**[●]**	

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

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	
A	**Priced contract with activity schedule**	

11.2(20)	The *activity schedule* is in			
11.2(30)	The tendered total of the Prices is	**(in figures)** **(in words), excluding VAT**		
A	**Priced contract with activity schedule**	**Data for the Shorter Schedule of Cost Components**		
41 in SSCC	The percentage for people overheads is:	**%**		
21 in SSCC	The published list of Equipment is the last edition of the list published by			
	The percentage for adjustment for Equipment in the published list is	**Minus %**		
22 in SSCC	The rates of other Equipment are:	**Equipment**	**Size or capacity**	**Rate**
61 in SSCC	The hourly rates for Defined Cost of design outside the Working Areas are	**Category of employee**	**Hourly rate**	
	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			
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:			

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:

Automatic Generator Control (AGC) and Generator Plant Remote Terminal Upgrade (RTU) Upgrade at Arnot Power Station for a Period of 18 Months.

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

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

Options A	The offered total of the Prices exclusive of VAT is	**R [●]**
	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:				
Name & signature of witness	*(Insert name and address of organisation)*		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				
Name & signature of witness	*(Insert name and address of organisation)*		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	**[●]**	**[●]**

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			

PART 2: PRICING DATA

ECC3 Option A

Document reference	Title	No of pages
C2.1	Pricing assumptions: Option A	1
C2.2	The *activity schedule*	5
	Total number of pages	6

C2.1 Pricing assumptions: Option A

1. How work is priced and assessed for payment

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

Identified and defined terms 11

11.2 (20) The Activity Schedule is the *activity schedule* unless later changed in accordance with this contract.

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

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

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

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

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

2. Function of the Activity Schedule

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

3. Link to the programme

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

4. Preparing the *activity schedule*

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

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

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

- Has taken account of the guidance given in the ECC3 Guidance Notes pages 19 and 20;
- Understands the function of the Activity Schedule and how work is priced and paid for;
- Is aware of the need to link the Activity Schedule to activities shown on his programme;
- Has listed and priced activities in the *activity schedule* which are inclusive of everything necessary and incidental to Providing the Works in accordance with the Works Information, as it was at the time of tender, as well as correct any Defects not caused by an *Employer's* risk;
- Has priced work he decides not to show as a separate activity within the Prices of other listed activities in order to fulfil the obligation to complete the *works* for the tendered total of the Prices.
- Understands there is no adjustment to the lump sum Activity Schedule price if the amount, or quantity, of work within that activity later turns out to be different to that which the *Contractor* estimated at time of tender. The only basis for a change to the Prices is as a result of a compensation event.

C2.2 the *activity schedule*

PART C2: PRICING DATA - ECC3 OPTION A (LUMP SUM)
Project Name: Arnot AGC, Generator Plant A & B RTU Upgrades
Contract No:

Item No.	Activity Description	Unit	Quantity	Rate	Amount
1.0	**Management and Site Establishment**				
1.1	Site Establishment	Lump Sum	1		
1.2	Mobilization and Demobilization	Lump Sum	1		
1.3	Project Management	Month	12		
1.4	Site Supervision	Month	12		
1.5	Health, Safety, Environmental, and Quality (SHEQ) compliance	Lump Sum	1		
2.0	**Engineering and Design**				
2.1	Detailed Engineering & System Design: Comprehensive design report certified by ECSA Registered Professional	Lump Sum	1		
2.2	I/O List & Database	Lump Sum	1		
2.3	Network Design	Lump Sum	1		

2.4	Drawings & Documentation	Lump Sum	1		
2.5	Software Engineering: Configuration, protocol mapping (IEC 60870-5-101), and architecture finalisation .	Lump Sum	1		
3.0	**SCADA & Networking**				
3.1	Intergration of the SCADA Servers (The existing Network system must connect to the existing servers)	Lump Sum	1		
4.0	**Supply and Factory Testing**				
4.1	Hardware Supply: Procurement and assembly of all RTU hardware, redundant modules, and peripherals .	Lump Sum	1		
4.2	Factory Acceptance Testing (FAT): Successful execution and quality release .	Lump Sum	1		
5.0	**Installation and Site Works**				
5.1	Decommissioning: Removal and disposal of old RTUs, Concentrators, and associated old cabling .	Lump Sum	1		
5.2	Installation: Complete mounting of new RTUs including all internal and field wiring	Lump Sum	1		
5.3	Temporary Works: Installation and removal of temporary cabling and changeover infrastructure .	Lump Sum	1		
6.0	**Commissioning and Integration**				
6.1	Cold Commissioning: Full loop checks, I/O verification, and hardware health checks.	Lump Sum	1		
6.2	Hot Commissioning & Site Acceptance Testing (SAT): Functional live testing and grid code compliance .	Lump Sum	1		
6.3	System Integration: Full software/hardware interface to BME, DCS, and MicroSCADA systems .	Lum Sum	1		
7.0	**Close-Out**				

7.1	Training & Technology Transfer: Handover workshops for Eskom technical and operationg staff	Lump Sum	1		
7.2	Documentation: Final submission of As-Built drawings, manuals .	Lump Sum	1		
	TOTAL TENDERED PRICE (EXCL. VAT)				
	VAT@15%				
	TOTAL TENDERED PRICE (INCL. VAT)				

C2.1 PRICING ASSUMPTIONS

1. This is a NEC3 Option A Lump Sum Contract
2. Payment is only made for activities that are 100% completed without Defects.
3. The Activity Schedule is only a pricing document. The Contractor provides the works in accordance with the Works Information .
4. The Lump Sum prices are inclusive of all work necessary to Provide the Works, even if not specifically itemised.
5. Quantities are the Contractor's risk. No adjustment to the price will be made if quantities differ from tender estimates .
6. Prices include all labor, materials, and consumables required to reach the functional outcomes described in the Works Information.

PART 3: SCOPE OF WORK

Document reference	Title	No of pages
	This cover page	1
C3.1	*Employer*'s Works Information	65
C3.2	*Contractor*'s Works Information	1
	Total number of pages	67

C3.1: EMPLOYER'S WORKS INFORMATION

Contents

1 Description of the *works*

1.1 Executive overview

A system called Automatic Generation Control (AGC) enables National Control to adjust the generated load of a generator from a distance. This system's goal is to keep the grid frequency at 50 Hz (or at the very least, within the permitted operating range). In extreme circumstances, failure to control grid frequency can result in a complete blackout. The associated loads can malfunction as a result of poor frequency regulation. A communication channel is established between the station and National Control, and information and orders are sent back and forth between the two points.
A Remote Terminal Unit (RTU) installed at the power plant, which serves as the interface between Transmission (National Control Centre, TEMSE) and Generation, is used to establish the communication channel.

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

- To conform to the Grid Code and NERSA Requirements (Network Code: Sec 3.1.6 – GCR6)
- Power Stations are required by the SA Grid Code to be on AGC for the ff:
  - Effective frequency control of the South African Grid and system stability.
  - The AGC achieves system stability by issuing control signals to generators that are on AGC to raise or lower their output power.
  - Arnot Power Station provides the following reserves whose response to the AGC is specified in the South African Grid Code (SAGC):
  - Instantaneous Reserves,
  - Regulating Reserve
  - Prevent total loss of monitoring of the Electrical Plant at the EOD Desk and National Control
  - Prevent interruption of the collection of plant history and remote operation of part the Electrical Plant (AUX)
  - Accurate measurement of energy generated by Arnot to national control for Arnot to receive all its revenue for power generated.

1.3 Interpretation and terminology

The following abbreviations are used in this Works Information:

Abbreviation	Description
ABB	Asea Brown Boveri
AC	Alternating Current
AGC	Automatic Generation Control

Abbreviation	Description
AIA	Approved Inspection Authorities
AVR	Automatic Voltage Regulation
BME	Bandwidth Management Equipment
C&I	Control and Instrumentation
CPU	Central Processing Unit
CW	Cooling Water
DB	Distribution Board
DC	Direct Current
DCS	Distributed Controls System
EMC	Electromagnetic Capability
EOD	Electrical Operating Desk
ERTU	Enhanced Remote Terminal Unit
FAT	Factory Acceptance Testing
GEN	Generator
GO	General Outage
GPS	Global Positioning System
HMI	Human Machine Interface
HV	High Voltage
IDF	Intermediated Distribution Frame
IEC	International Electro-technical Commission
IO	Input Output
IP	Ingress Protection
IST	IST RTU
LAN	Local Area Network
LV	Low Voltage
MCB	Main Circuit Breaker
NC	National Control
NEC	New Engineering Contract
NDT	Non-destructive Testing
NO	Normally Open

Abbreviation	Description
NTP	Network Time Protocol
OEM	Original Equipment Manufacturer
OHS	Occupational Health and Safety
OLE	Object Linking and Embedding
OPC	OLE for Process Control
OSP	Outside Plant
P&ID	Piping and Instrumentation Diagram
PT&M	Protection Telecommunication & Metering
PVC	Polyvinyl Chloride (PVC Coated Cables)
QC	Quality Control
QCP	Quality Control Process
ROC	Required Operational Capability
RTU	Remote Terminal Unit
SANS	South African National Standard
SAT	Site Acceptance Testing
SHEQ	Safety, Health, Environment and Quality
SCADA	Supervisory Control and Data acquisition
SCASS	Supervisory Control and Security Systems
SIT	Site Integration Testing
SRD	Stakeholders Requirements Definition
STANBNAC	Standby National Control Centre
TEMSE	Transmission Energy Management System Evolution
TX	Transmission
UPS	Uninterruptible Power Supply
VDSS	Vendor Document Submission Schedule

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:

2.1.1 Project kick-off meeting

A kick-off meeting is held before any work commences. The *Project manager* Schedules a Kick off meeting before any work commences based on the contractor's availability and the availability of Key people. The Kick-off meeting is attended by all the key people for the purpose of introduction of teams.

2.1.2 Risk reduction meetings

Interval	Location	Attendance by:
Adhoc	ARNOT P/S	*Project Manager, Employer*, *Contractor*, *Supervisor*, and Others as required
At the risk reduction meetings items as prescribed in ECC Core Clauses 16.2 and 16.3 are discussed. The Risk Register is updated, by the *Project Manager,* and distributed within five days of the meeting.		

2.1.3 Operational meetings

Interval	Location	Attendance by:
Monthly	ARNOT P/S	*Project Manager, Contractor*, *Supervisor*

An operational meeting is held, by tele- or video conference, if necessary, between the *Project Manager* and the *Contractor's* project manager to monitor and control the design, manufacturing and planning processes. Typical topics for discussion at this meeting will include *Contractor*'s reporting on the following:

- Review of Project Progress (Programme) with specific focus on Key Dates and interim milestones;
- Key Risks (threats) and Issues and, where applicable, identify and agree on associated preventive/contingent and recovery actions;
- Review of Actions List;
- Review of Communications.

2.1.4 Implementation meeting for specific progress and feedback

Interval	Location	Attendance by:
Daily during implementation	ARNOT P/S	*Contractor* and *Supervisor*
The implementation meeting is held between the *Contractor* and *Supervisor*'s implementation support team, to report on implementation progress and review any risks, issues and *Employer* actions that need to be resolved in order to ensure smooth implementation of the *works*.		

2.1.5 QC Meetings during implementation

Interval	Location	Attendance by:
Daily during implementation	ARNOT P/S	*Contractor* QC representative and *Employer* QC representatives
The *Contractor's* QC representatives provide reports from each meeting to the *Employer's* project QC Group. This report will cover: • Scheduled QC inspections for the period identified in the meeting. • Any new QC related issues identified since the last report, its status and action plan for resolution. • Status and progress on previously reported quality issues.		

2.1.6 Meetings of a specialist nature

Interval	Location	Attendance by:
Adhoc	Any	*Employer's* personnel, the *Project Manager, the Contractor*, the *Supervisor*, and Others as required
Meetings of a specialist nature may be convened by persons and at times and locations to suit the Parties, the nature and the progress of the *works*.		

2.1.7 "Table Top" meetings

Interval	Location	Attendance by:
Adhoc	Any	*Employer's* personnel, the *Project Manager, the Contractor*, the *Supervisor*, and Others as required
To manage the occupancy of the Working Areas during implementation, the *Contractor* attends the "Table Top" meetings with the *Employer's* Outage representative in order to discuss area work load and to integrate and schedule the *Contractor's* activities as such as to allow sufficient space for implementation.		

2.1.8 Post implementation meeting for project feedback and review

Interval	Location	Attendance by:
Post unit implementation	ARNOT P/S	*Project Manager, Contractor* Senior Manager (not the *Contractor*'s *Project Manager*), *Contractor*'s *Project Manager*, *Supervisor, Employer's* personnel, Others as required
The post implementation meeting is held between the *Project Manager*, *Contractor* senior management, *Supervisor,* Outage control centre management and other line groups, to report on implementation issues and reviews. Share lessons learnt in order to ensure smooth implementation on the next implementation phase.		

Monthly contractor's safety meetings

The *contractor's* Site Manager and the safety officer attend a monthly *contractor's* safety meeting which is scheduled by the *employer's* safety department. The *contractor* schedule monthly statutory meeting attended by all his/her employees as stipulated OHS ACT 85 of 1993. The *contractor* submits monthly manpower statistics by the last day of every month.

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

2.2.1.1 General Requirement

(1) The Contractor includes the Employer's document number in the title block. This requirement only applies to design documents developed by the Contractor and his Sub-Contractors. It does not apply to documents developed by manufacturers for equipment and material.

(2) The project name shall be listed on all documents, including manufacturers' drawings. Tag numbers and equipment names shall be listed on all manufacturers' drawings.

(3) The language of all documentation shall be in the English language. The units of measure shall be metric.

(4) The Contractor retains project design calculations and information for the entire life cycle of the plant and provides these to the Employer on prior written notice at any time notwithstanding the expiry or termination of the contract.

2.2.1.2 Document Identification

(1) The Contractor shall be required to submit the Vendor Document Submission Schedule (VDSS) as per agreed dates with the Project Manager. The Project Manager shall pre-allocate document numbers on the VDSS if possible and send back to the Contractor.

(2) The VDSS is revisable, and changes shall be discussed and agreed upon by all parties. Changes in the VDSS can be additional documentation to be submitted, changes in submission dates or corrections in documentation descriptions, document numbers, etc. The Contractor shall provide his own document numbering system for the VDSS.

2.2.1.3 Documents Submission

(1) All project documents must be submitted to the delegated Eskom Representative with transmittal note according to Project / Plant Specific Technical Documents and Records Management Work Instruction (240-76992014). In order to portray a consistent image it is important that all documents used within the project follow the same standards of layout, style and formatting as described in the Work Instruction.

(2) The Contractor is required to submit documents as electronic and hard copies and both copies must be delivered to the Eskom Representative with a transmittal note.

(3) In addition, the Contractor shall be provided with the following standards which must be adhered to:

a. Project Handover Documentation Management Procedure (240-66920003).
b. Project Documentation Deliverable Requirement Specification (240-65459834).
c. Technical Documentation Classification and Designation Standard (240-54179170).

2.2.1.4 SharePoint Transmittal

(1) The Contractor shall submit all documentation to the Eskom Representative as well as the Project's Documentation Centre in the following media:

a. Electronic copies shall be submitted to Eskom Documentation Centre through SharePoint transmittal site that will be provided during contract award.
b. Hard copies shall be submitted to the Eskom Representative accompanied by the Transmittal Note.

2.2.1.5 Drawings

(1) The creation, issuing and control of all Engineering Drawings will be in accordance to the latest revision of 240-86973501 (Engineering Drawing Standards – Common Requirements) to be supplied as part of the enquiry documents. An electronic copy of all drawings shall be issued to the Project Manager.

(2) All Contractors are required to submit electronic drawings in Micro Station (DGN) format, and scanned drawings in pdf format. No drawings in TIFF, AUTOCAD or any other electronic format shall be accepted. Drawings issued to Eskom may not be "Write Protected" or encrypted.

(3) The Contractor shall supply the Project Manager with a complete list of drawings, upon which the Project Manager will supply Eskom drawing numbers.

2.2.2 CONFIGURATION MANAGEMENT

2.2.2.1 Plant Coding Allocation

(1) Coding of the design shall be based on the KKS coding system and the Project Manager shall undertake the coding in line with its standards.

a. The KKS coding shall be applied during the design review stage(s) and cross referenced to all arrangement drawings, schematics, wiring diagrams, instructions and manuals and where practical to spare parts list/manuals.

b. The Contractor shall be required to include allocated coding to the electronic design drawings.

2.2.2.2 Plant Labelling

(1) The Contractor shall also manufacture and install KKS labels to identified plant items as per list supplied by the Employer.

a. Labels shall be manufactured and installed according to the Employer's KKS Plant Labelling and Equipment Descriptions Standard.

b. The labelling standard shall be supplied as part of the enquiry documents.

2.2.2.3 Engineering Change Management

(1) All Design change management shall be performed in in line with the Eskom Project Change Management Procedure (240-53114002) and the Employer ensures that Contractor is provided with latest revisions of this procedure.

(2) Any uncertainty regarding this procedure should be clarified with the Employer and clarification updates should be reflected in updated versions of this procedure.

2.2.2.4 Design Review Documentation

(1) The Contractor conducts design reviews as per the Contractors official design review procedure.

a. Contractor further takes note of the Employers Design Review Procedure (240-53113685) and participates in all design reviews as specified by the Employer.

b. The Employer may "Accepted"; "Accept with Comments" or "Rejected". If required, the Contractor makes the necessary revisions on the documentation and ensures acceptance is obtained from Employer. The Contractor includes these design reviews as part of the schedule and suggests appropriate timing for such reviews.

3 Standards and Reference Documents

Where references are made to a code, specification or standard, the reference shall be taken to mean the latest edition of the code, specification or standard (including all appendix supplements and revisions of the document).

3.1 Health and safety risk management

3.1.1 SHE Specification

The *Contractor* complies with the *Employer's* Level 1 Construction Safety, Health and Environment Procedure, number 32-136. SHE specification guidelines to which *Contractor* complies with are supplied by the *Employer*.

A project specific SHE file is to be created by the *Contractor* and submitted together with a completed copy of the Construction Regulations Checklist to the *Supervisor* for acceptance within 2 months of the *starting date* following which the *Contractor* maintains and updates the file.

It is to be noted that before any work can commence on Site, the *Contractor* must have performed a detailed risk assessment of the work to be performed and/or the work area where work is to be performed. The risk assessment is documented and discussed with the parties involved with the work and is to be submitted to the *Supervisor* for acceptance.

Personnel protective clothing as specified in the Act for all work, is provided and is kept in good order by the *Contractor*. A hard hat (with chin strap), safety boots, ear plugs and safety glasses are mandatory safety equipment at the Site. Protective clothing for work in the controlled zone is prescribed and is supplied by the *Employer*.

3.1.2 Incident Management

The *Employer's* procedure 32-95 - Environmental, Occupational Health and Safety Incident Management Procedure, states the requirements for the effective management of incidents that may occur or could result in, occupational diseases/illnesses, fatalities, injuries, near misses, and/or environmental damage.

3.1.2.1 Reporting of SHE incidents:

All incidents occurring on site while Providing the Works shall be reported, to *Supervisor*, as soon as practicable but not later than the end of that shift , and in the event of an incident as defined in terms of Section 24 of the OHSACT, 85 of 1993 where someone dies, becomes unconscious, suffers the loss of a limb or part of a limb is also reported immediately to the Department of Labour by the *Contractor*.

The following are requirement for the *Contractor*, The Corrective Action Process:

- In the event of any incident or accident, a flash report is completed by the *Contractor* and submitted before end of shift or within 24hrs to the *Employer* and the *Supervisor*.
- The *Employer's* template for the flash report is included in the *Contractor*'s health and safety plan.
- Where applicable, the *Supervisor* will mobilises an incident investigation team who will investigate the incident within 7 days, complete the *Employer's* corporate documentation, indicating the root causes, corrective actions and recommendations for submission to the *Employer's* OH&S Department.
- The *Contractor* must submit proof of corrective action within pre-determined due dates to the *Employer's* OH&S Department,

3.1.2.2 Investigation and recording of incidents:

All incidents are investigated by the *Contractor* with the assistance of the *Supervisor*, to establish the direct, indirect and root cause of such incident as well as any reactive/preventative measures required and implemented to prevent a re-occurrence of such future incidents. Any such incident is recorded by the *Contractor* as required by General Administrative Regulation 9(1) of the OHSACT, 1993. The *Contractor* complies with the timeframes of investigating incidents as required in terms of General Administrative Regulation 9(2)

3.1.2.3 Environmental incidents

Environmental incidents could include but is not limited to:

- Release of effluent to the environment
- Non-compliance to station water permit conditions
- Non-compliance to station sewage permit

- Non-compliance to waste site permits
- Illegal dumping of waste
- Environmental Impact Assessments (EIA) not undertaken for projects
- Non-compliance to EIA Record of Decision (ROD)
- Cutting down of protected plant species
- Harming of protected animal species

The *Supervisor* will inquire into all incidents including near–misses during contractor audits.

3.1.3 Health and safety plan

The *Contractor's* health and safety plan is the *Contractor's* proposal of how the work will be carried out considering the hazards expected and procedures.

The *Supervisor* reviews and accepts the health and safety. The construction regulation checklist with the required information must be included in the health and safety plan.

The *Contractor* ensures that contents of the health and safety plan for the project shall include at least:

- A copy of the principal contractor appointment letter.
- The scope of *works* /description of the work for which the *Contractor* was appointed.
- The *Contractor's* risk assessment including control/mitigation measures to address all the risks identified.
- The risk based legislative appointments made, by the *Contractor*, as required by the construction regulations.
- The risk based legislative checklists and registers to be completed, by the *Contractor*, as required by the construction regulations.
- Certified copies and proof of competencies of all *Contractor* appointees i.e. training certificates, permits, medical certificate of fitness and curriculum vitae where required.
- Copies of identity documents for *Contractor's* employees / workers appointed for the *works*.
- Accident/incident registers to be kept, by the *Contractor*, in the event of any incidents, including near misses. A copy of the *Employer's* flash report template is included in the *Contractor's* health and safety plan, should it be required in the event of an incident.
- Any waste management and pollution prevention by the *Contractor* – where required permits for dumping/incineration at authorised facilities. The *Contractor* must consult and comply with the *Employer's* applicable waste procedure
- Proof of the *Contractor's* registration and letter of good standing with COID or other registered insurer, Construction Industry Development Board (CIDB) and/ or Electrical *Contractor*s Board.
- A SHE Programme, compiled by the *Contractor*, using the template.
- The *Supervisor's* letter of acceptance of the health and safety plan is added as soon as it is obtained.

The *Contractor* submits the health and safety plan, 30 days prior to commencement of any part of the *works* on Site, to the *Supervisor*, who verifies whether contents for acceptance. The *Contractor's* health and safety plan will be returned to the *Contractor*, should it not contain the required information or where the necessary permits have expired.

The accepted *Contractor's* health and safety plan must be on the Site. Periodic audits are conducted to ensure that the *Contractor's* health and safety plan is implemented and maintained as the project progresses. Refer Construction Regulation 4(1)(d).

When the *Contractor* is required to review and update documentation on the *Contractor's* health and safety plan, the plan must be re-submitted to the *Supervisor* for acceptance.

3.1.4 Health and safety file

The *Contractor's* health and safety file is separate from the *Contractor's* health and safety plan. The *Contractor's* health and safety file is progressively populated with checks and inspections, as indicated in the *Contractor's* health and safety plan. Any drawings, designs, materials used, structural integrity testing and any other similar information applicable to the project will be placed on the *Contractor's* health and safety file.

The *Contractor's* health and safety file must be available on request and should be handed over to the *Supervisor,* prior to the Completion Date (Refer Construction Regulations 5(7) and 5(8)).

Depending on the nature of the *works* and detail of the information on the *Contractor's* health and safety file, e.g. asbestos work where there is a requirement for medical surveillance of workers who will be exposed to asbestos, it is recommended that the *Contractor* keeps these records for forty years, in terms of Asbestos Regulations 16(f).

Where the Contractor's employees / workers are exposed to hazardous chemical substances and where a medical surveillance was required, it is recommended that that the Contractor keeps these records for thirty years, as stipulated under the Hazardous Chemical Substances Regulations 9(f).

The Contractor ensures that all other medical surveillance requirements in terms of the OHS ACT, where applicable, is complied with for the Contractor and Sub-contractor organisations.

The Contractor's health and safety file is audited by the Supervisor or his delegate, to ensure that work is being carried out and the necessary checks and inspections are conducted in accordance with the Contractor's plan.

3.1.5 Risk assessments

The *Contractor* appoints a competent risk assessor, in writing, to perform risk assessments (Construction Regulation 7(1)). The *Contractor* is however required to use the *Employer's* methodology and provide a project specific risk assessment with the *Contractor's* health and safety plan, submitted for review and acceptance by the *Supervisor*. The *Contractor's* risk assessment includes a monitoring and review plan as required by Construction Regulation 7(1). No work may commence on Site, until the *Contractor's* risk assessment has been accepted by the *Supervisor*.

The *Contractor* ensures that ergonomic hazards have been identified evaluated and addressed. as required by Construction Regulation 7(6).Hazards the *Contractor* must consider include:

- improper lifting techniques,
- continuous repetitive movements with body parts in extreme postures; and
- poor grips on tools or carrying containers with no handles.

Whenever changes to methods of working / manufacture or materials are introduced, the *Contractor's* risk assessment is reviewed, including controls and mitigation measures and submitted to the Supervisor for review and acceptance. Following acceptance the *Contractor's* risk assessment must be placed in the health and safety plan, for implementation.

The *Employer's* risk assessment chart is completed, by the *Contractor*, during the *Contractor's* pre-job briefs and displayed at the entrances to those areas of the Site. The template is available from the *Supervisor*.

The *Contractor* ensures that all *Contractor*'s employees are informed, instructed and trained by a competent person regarding the hazards, risks and related work procedures. These employees must carry proof of such training, for the duration of the project. (Construction Regulation 7(9)).

With regard to environmental considerations, the *Contractor* ensures that any aspect from a product or activity that might have an impact on the air, water, marine and soil or which may have the potential to cause harm to the environment is addressed in the *Contractor's* risk assessment, in order to avoid any environmental incidents while Providing the Works. Where such impact cannot be avoided, the *Contractor* ensures that the necessary steps are taken to minimise and remediate such impact. (refer to Section 28 of National Environmental Management Act, 1998).

3.1.6 Accident - Incident Reporting Protocol

The reporting of accidents/incidents is a legal requirement as outlined in the OHSAct, section14 (e)

3.1.7 *Employer's* lifesaving rules

The *Contractor* complies with the *Employer's* five rules as stipulated in the *Employer*'s Management Directive 32-421. The *Employer* takes a ZERO TOLERANCE stance to violation of these rules:

- Rule 1: Open, isolate, test, earth, bond, and/or insulate before touch.
- Rule 2: Hook up at heights.
- Rule 3: Buckle up.
- Rule 4: Be sober.
- Rule 5: Permit to work.

3.2 Environmental constraints and management

(1) The Contractor ensures that all goods, services or works supplied in terms of the Contract comply with all applicable environmental legislation (National Environmental Management Act, 1998 [Act No 107 of 1998]).

(2) The Contractor is responsible for keeping the work area clean of any environmental waste. All waste introduced and/or produced on the Employer's premises by the Contractor for this Contract, is handled in accordance with the minimum requirements for the Handling and Disposal of Hazardous Waste in terms of Government Legislation as proclaimed by the Department of Water Affairs and Forestry and Employer's environmental requirements (Waste Management Procedure)

(3) All environmental incidents must be reported to the Project Manager within 24 hours of such occurrence. All environmental incidents occurring on the Site (or on any other places, if any, as may

be specified under the Contract as forming part of the Site) must be recorded, detailing how each incident was dealt with in an Environmental Incident register. The Contractor uses as reference the ENVIRONMENTAL MANAGEMENT ACT.

3.3 Quality assurance requirements

(1) The Employer places emphasis on the provision of a comprehensive Quality Management System (QMS) for all phases of the project in accordance with QM-58. The QMS shall comply with the requirements of ISO 9001.

(2) The Contractor and all of the Contractors' suppliers shall hold a valid certificate of compliance for their QMS to the requirements of ISO 9001:2008. The Employer may at his sole discretion carry out an audit any supplier or sub-supplier QMS for compliance.

(3) Documents shall be submitted for review and acceptance by the Project Manager prior to the commencement of work.

(4) The Contractor shall submit a fully detailed Quality Control Plan / ITP for acceptance in accordance with the Vendor Document Submission Schedule (VDSS).

(5) No work is allowed on Site unless the Employer accepts the Quality Control Plan.

(6) The Contractor shall utilise the Employer's quality documentation forms for requesting access, erection checks etc. These request forms are to be submitted to the Supervisor at least one week prior to the requested activity, or as agreed to by the Project Manager.

(7) Apart from any statutory data packages required, the Contractor shall also compile a data package of the relevant drawings, test certificates etc. for each section of work which is to be reviewed and signed off by the Supervisor at erection stage prior to the commencement of the commissioning phase.

The following, as a minimum, shall be submitted as part of a comprehensive Quality Assurance Data Package:
1. Manufacturing & Test Records
2. Supplier's Certificates of Conformance
3. Supplier's Inspection & Test Certificates
4. Equipment Qualification Test Reports
5. Inspection Release Reports
6. Completed FATs & SATs shall form part of the QADP
7. Bill of Material, Material Numbers & Suppliers
8. Overhaul Procedures and Specifications
9. Test Procedures and Specifications
10. Serial Numbers of Installed Items
11. Recommended Spares List
12. Detailed Manufacturing Drawings
13. Isometric drawings and wiring diagrams
14. Commissioning-related documentation
A documentation list, as part of the Configuration Management Document, shall be compiled and kept current and updated at all times

3.3.1 *Contractor's* Quality Control Plans (QCPs)

The QCP typically consist of the following as a minimum:

- A cover page that includes and makes provision for the following:
  - Document unique number
  - Revision number
  - Page number
  - Provision to incorporate all inspection report numbers
  - Plant/system worked on
  - High level description of work execution
  - Provision for review and acceptance signatures by the *Contractor*, the *Employer* and the *Employer's* AIA/QA representative (where applicable).
  - Provision for final release signatures by the *Contractor*, the *Employer* and the *Employer's* AIA/ QA representative (where applicable).
- A page which includes a high level logical sequence of work execution
- A page which includes:
  - Drawing numbers
  - Abbreviations
  - Records numbers
  - Procedures numbers
  - Reference document numbers
  - Certificate numbers and references
- The work execution logic and sequence.
- Hold and witness points
- A Materials summary that includes:
  - Material quantities and dimensions
  - Material certificate numbers or receipt inspection reference numbers with adequate traceability to material/other certificates.
- A thickness test report where thickness tests are carried out on components. The thickness test results are recorded and the positions of the measurements are traceable to the specific area of testing against the records.
- The *Contractor* shall prove that his ISO 9001 certification is valid.
- In accordance with classification 0004/09Q the service is classified as a Q2 quality level. The fire detection system shall be designed in accordance with an internationally recognised quality management system.
- The *Contractor* shall meet Eskom's quality requirements as specified in the document 238-102 Quality requirements for the procurement of assets, goods and services.
- The *Eskom* hold, witness and verification points shall be signed by all the relevant *Eskom* appointed representatives prior to continuation of work.
- The *Contractor* shall make available to *Eskom*, for their approval, documentation describing the experience of the personnel who shall perform the requirements of this specification. The contractor's personnel shall be adequately experienced in design of seismically qualified nuclear facilities.
- The *Contractor* is hereby notified that *Eskom* may submit their design for review by an *Eskom* appointed third party.

3.4 Programming constraints

3.4.1 Programme constraints and requirements

The *Contractor* prepares and submits at the stated intervals, all programming documentation described in this section, the layout of which is subject to the *Project Manager's* acceptance.

3.4.1.1 The programme

The programme shows all the information required by Clause 31.2 of the ECC3.

In addition, the programme shows:

- the services and work (programmes) of the subcontractors,
- interfaces between subcontractors as well as the interfaces between subcontractors and the *Contractor*,
- all activities defined in the *activity schedule*,
- dates for placement of orders for critical / major Plant, Material and Equipment,
- on Site delivery dates for Plant, Materials and Equipment,
- the programme's revision number.

A separate programme (Outage Implementation Programme) detailing pre-outage implementation and outage implementation may be compiled for each refuelling outage. This will facilitate integration of the *Contractor's* outage programme into the *Employer's* overall outage plan. The *Contractor*, however ensures that the start and finish dates of the "Outage Implementation Programme" corresponds to the Outage Implementation dates of the Accepted Programme.

For the sake of compatibility, the *Contractor* prepares his programme on MS Project computerised planning software and utilises it for all planning, progress monitoring and reporting.

3.4.1.2 Monthly progress reporting

The *Contractor* submits to the *Project Manager* a monthly report following the *assessment date*, but by no later than the last day of each month. The report contains the following information as a minimum requirement:

- Executive summary. (Narrative identifying major movement within the reporting period.)
- Revised programme for *Project Manager's* acceptance indicating, actual progress of work against last Accepted Programme.
- Updated "List of Applicable Documents" which is a list (table) indicating the "current accepted" revision as well as the status of any later revisions of documents considered key in the control of Providing the Works and include the following as a minimum:
  - Contract Quality Plan
  - Scheme Design
  - Installation Design
  - Work Plan
  - Test Procedures
  - Safety Evaluation (Screening/Evaluation/Justification)
  - Safety Case

- List of Activities which:
  - were completed during current reporting period per discipline, (including the activities of the *Employer* and Others);
  - are in progress (including the activities of the *Employer* and Others);
  - are to be undertaken during the next reporting period per discipline, including the activities of the *Employer* and Others;
  - are behind schedule together with an action plan on how the delays are to be rectified.
- Proposed monthly assessment information which is based on the list of activities that were completed during the current reporting period.
- Revised activity schedule which indicates projected future cashflow
- Key issues / Items of concern and corrective actions.
- Progress curves
- Early warning log
- Compensation event log
- Critical activities

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

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

3.5.1.1 People

The *Contractor* employs in and about the Provision of the Works only such persons that are careful, competent and efficient in their several trades and callings, and the *Employer* reserves the right to object to and require the *Contractor* to remove from the *works,* forthwith, any person employed by the *Contractor* in or about the Provision of the Works who, in the opinion of the *Project Manager*, misconduct's himself or is incompetent or negligent in the proper performance of his duties and such person is not again employed for the *works* without the written permission of the *Project Manager*.

The *Contractor*, in and about the Provision of the Works, provides evidence of skills assessment (including qualifications) for all its staff. *Contractor* project manager, QC and supervisors are required to present SAQA approved certificates (or equivalent), for the position that they fulfil. The *Contractor*'s project manager is trained on the NEC ECC3 prior the *access date*. Any personnel that do not meet the panel requirements will have their access to site revoked.

All engineering work is performed by suitably qualified and experienced individuals. The seismic analyst as well as the independent design reviewer(s) be registered as professional engineers with the Engineering Council of South Africa (or equivalent international body).

The *Contractor* ensures that the *Contractor's* employees are reasonably fluent in the language of the contract.

The *Contractor* maintains at all times a harmonious relationship with and co-operates with the *Employer* and all its suppliers and sub-suppliers or their employees who may be involved.

3.5.1.2 Supervision

The South African Construction Regulations require the *Contractor* to appoint a full-time competent employee to supervise the performance of construction work. The *Contractor* (as principal contractor in terms of the OHSA Construction Regulations) therefore appoints, in writing, a competent full time construction supervisor and where required an assistant supervisor, clearly stipulating all duties relating to the supervision of the particular project.

The *Contractor's* construction supervisor must be registered as a professional construction manager in terms of the Project and Construction Management Act, 48 of 2000

The *Contractor* may appoint additional people (assistant construction supervisor) to assist the construction supervisor to perform certain of his functions, but this does not relieve the construction supervisor of his or her responsibilities under the regulations. If the *Contractor* has not appointed additional people to assist the construction supervisor, and an inspector determines that the construction supervisor needs assistance, he can instruct the *Contractor* to do so, at no additional cost to the *Employer*.

No work may be performed, by the *Contractor*, unless in the presence of the *Contractor's* construction supervisor or assistant construction supervisor.

The *Contractor's* construction supervisor and assistant construction supervisor shall be fully conversant with the contents of the *Contractor's* health and safety plan including the following and shall stop any or all work which is not in line with these provisions:

3.5.1.3 Construction health and safety practitioners

The *Contractor's* construction health and safety agent (as a specified category in terms of section 18 (1) (c) of the Project and Construction Management Professions Act No. 48 of 2000) is appointed to ensure that the *Contractor* complies with its statutory duties under the Occupational Health and Safety Act (Act No. 85 of 1993) and applicable regulations such as the Construction Regulation, etc.

Key personnel

The *Contractor* ensures that all key personnel requiring access to Site meet the requirements of the *Employer's* security and medical qualifications as well as training and experience generally required by similar utilities elsewhere in respect of similar work. Where required, these staff members also meet such requirements as the National Nuclear Regulator may stipulate from time to time.

During any on Site construction stages, the *Contractor* ensures continuous on Site supervision of the *works* by its supervisors.

The *Contractor* provides orientation and technical training for all key personnel requiring access to Site in accordance with the requirements of the *Employer's* Radiological Safety Regulations, the *Employer's* Industrial Safety Programme, and, in general, the whole framework of plant rules (as applicable) and regulations which may be in force at the *Employer's* Site from time to time, which is available on request.

The following are considered key persons by the *Employer* and the *Contractor* shall submit a brief CV with associated records of qualification and related experience at the Contract Date:

- *Contractor's* project manager

- *Contractor's* planner
- Design engineer
- Construction and installation supervisor(s)
- Quality assurance representative
- Quality control inspector(s)
- Health and safety representative
- Planner

3.5.1.4 Emergency mustering, accountability and evacuation

Due to the nature of the Site, the *Contractor* is required to have full accountability of personnel at all times. It is therefore required that the *Contractor* has and maintains a current status and accountability list of all his personnel on Site. The accountability list is handed to the *Project Manager* each time a change occurs.

he *Contractor* ensures that his site representative takes full responsibility of this requirement and that he and his personnel are fully conversant with the mustering requirements as detailed in the *Employer*'s procedure

3.6 Invoicing and payment

Within one week of receiving a payment certificate from the *Project Manager* in terms of core clause 51.1, the *Contractor* provides the *Employer* with a tax invoice showing the amount due for payment equal to that stated in the *Project Manager's* payment certificate.

The *Contractor* shall address the tax invoice to 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;
- (add other as required)

At the assessment stage a Payment Certificate will be prepared by the *Project Manager* in conjunction with the *contractor*. After the submission and approval of the Payment Certificate, 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* includes the following information on each tax invoice:

Name and address of the *Contractor*
The contract number and title;
Contractor's VAT registration number;
The *Employer*'s VAT registration number 4740101508;
The total Price for Work Done to Date which the *Contractor* has completed;
Other amounts to be paid to the *Contractor*;
Less amounts to be paid by or retained from the *Contractor*;
The change in the amount due since the previous payment being the invoiced amount - excluding VAT, the VAT and including VAT;
(add other as required)

The *Contractor* attaches the detail assessment of the amount due to each tax invoice showing the Price for Work Done to Date for each item in the Price List for work which he has completed.
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Details on how to submit invoices and additional information:

- Ensure that the Eskom order number is clearly indicated on your invoice together with the line number on the order you are billing for. All Electronic invoices must be sent in PDF format only.
- Each PDF file should contain one invoice; or one debit note; or one credit note only as Eskom's SAP system does not support more than one PDF being linked into workflow at a time.

Email addresses for invoice submission: invoiceseskomlocal@eskom

3.6.1 Assessments

The *Contractor* includes in the Monthly Planning Report the proposed assessment information. Failure to submit such information on the assessment date will result in the *Project Manager* making his own assessment, based on available information.

The *Contractor* submits, separately, all documentation and certification in support of the proposed assessment information.

3.6.2 Compensation events

3.6.2.1 Concurrent delay

If the *Contractor* incurs additional costs that are caused both by *Employer* delay and concurrent *Contractor* delay, then the *Contractor* may only recover compensation to the extent the *Contractor* is able to separately identify the additional costs caused by the *Employer* delay from those caused by the *Contractor* delay. If the *Contractor* would have incurred the additional costs in any event as a result of *Contractor* delays, the *Contractor* is not entitled to recover those additional costs

3.6.2.2 Mitigation of delay

The *Contractor* has a duty to mitigate the effect, of *Employer* risk events, on the *works* and the *Contractor* does all it reasonably can to avoid an impact on the Prices. The duty to mitigate does not extend to the *Contractor* to adding extra resources or to work outside its planned working hours.

3.6.2.3 Quotation

The *Contractor* provides quotations for compensation events detailing the following items as a minimum:

- Introduction
- Executive summary
- Contractual basis of compensation event (Refer to ECC Core Clause 60.1)
- Details of the compensation event
- Assessment of compensation event (ECC Core Clause 63)
- Conclusion
- Accepted programme showing impact of delay ((ECC Core Clause 62.2) – If the programme for remaining work is altered by the Compensation Event
- Appendices:
  - Early Warning (ECC Core Clause 16.1) - if applicable
  - Notification (ECC Core Clause 61.3)
  - Instruction to submit quotation (ECC Core Clause 61.1 or 61.2)
  - Instruction to submit alternative quotation (ECC Core Clause 62.1) or to submit a revised quotation (ECC Core Clause 62.4) - if applicable
  - Any extension of time under (ECC Core Clause 62.5) - if applicable

- Any other document(s) the *Contractor* may consider applicable.

For compensation events to be implemented, the *Employer* requires the *Contractor* to sign a compensation event register form. For any payments required as a result of the compensation event, the *Contractor* is required to submit the signed compensation event register form, at latest, prior to the 15th of the month in which any associated amount should be assessed. This is to allow sufficient time for the *Employer* to load the associated costs onto its SAP system.

It is specifically stated that the *Employer* will not accept any forecasted payments relating to "compensation event acceptance".

3.7 Insurance provided by the *Employer*

No additional insurances provided by the *Employer*

3.8 Contract change management

- All Design change management shall be performed in in line with the Eskom Project Change Management Procedure (240-53114002) and the Employer ensures that *Contractor* is provided with latest revisions of this procedure.
- Any uncertainty regarding this procedure should be clarified with the Employer and clarification updates should be reflected in updated versions of this procedure.
- The *Contractor* is responsible to document and resolve any required changes on his design/equipment. The approval process indicated in this Works Information is adhered to, by the *Contractor*
- The Contractor develops implements and maintains a DCR (design change request) procedure. The DCR process is submitted to the Project Manager for acceptance, prior to the Contractor implementing it.

3.9 Provision of bonds and guarantees

The form in which a bond or guarantee required by the *conditions of contract* (if any) is to be provided by the *Contractor* is given in Part 1 Agreements and Contract Data, document C1.3, Sureties.

The *Employer* may withhold payment of amounts due to the *Contractor* until the bond or guarantee required in terms of this contract has been received and accepted by the person notified to the *Contractor* by the *Project Manager* to receive and accept such bond or guarantee. Such withholding of payment due to the *Contractor* does not affect the *Employer*'s right to termination stated in this contract.

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

The *Contractor* keeps all records, for presentation to the *Project Manager,* for compensation events.

3.11 Training workshops and technology transfer

The *Contractor* is responsible for the development and delivery of the following training at Arnot Power Station:

(1) Functional system documentation package (documentation only)

i. System description document (general information of plant equipment, materials and functions).
ii. Functional diagrams
iii. Signal and alarm lists

(2) Operator training

i. Operation, maintenance and troubleshooting

(3) Maintenance training

i. Hardware/software configuration
ii. Engineering, operation, maintenance and troubleshooting
iii. Software and tools required for installation, configuration, maintenance and troubleshooting

(4) Engineering training

i. Design philosophy
ii. Hardware/software configuration

The Contractor shall also provide a comprehensive training manual covering all training aspects. This training manual must be submitted to and approved by the Engineer prior to use. The Contractor is responsible for delivering the approved training as classroom sessions to all relevant departments, including Operations, Engineering, and Maintenance. The Contractor shall accommodate any number of participants without additional charges beyond the contract sum, ensuring full competence in system operation, maintenance, and troubleshooting in accordance with the NEC contract requirements.

4 Engineering and the *Contractor*'s design

The Outside Plant Hitachi Energy MicroSCADA system is located at the Electrical Operating Desk (EOD), and fulfils the supervisory control functions necessary for the control and monitoring of the following plant areas, namely:

1. AGC Control (AGC RTU).
2. Generator Plant (Gen Plant A & B RTU)
3. 275kV Switch Yard (275kV RTU).
4. 400kV Switch Yard (400kV RTU).
5. Outside Plant (Outside Plant RTU).

The scope of this project as documented herein focuses only on the AGC, Generator Plant A and Generator Plant B RTUs replacement. It aims at ensuring that the completed system is fully operational as per the functional requirements of the interfaced systems. Figure 1 gives a graphical representation of the existing Hitachi Energy MicroSCADA system for Arnot Power Station.

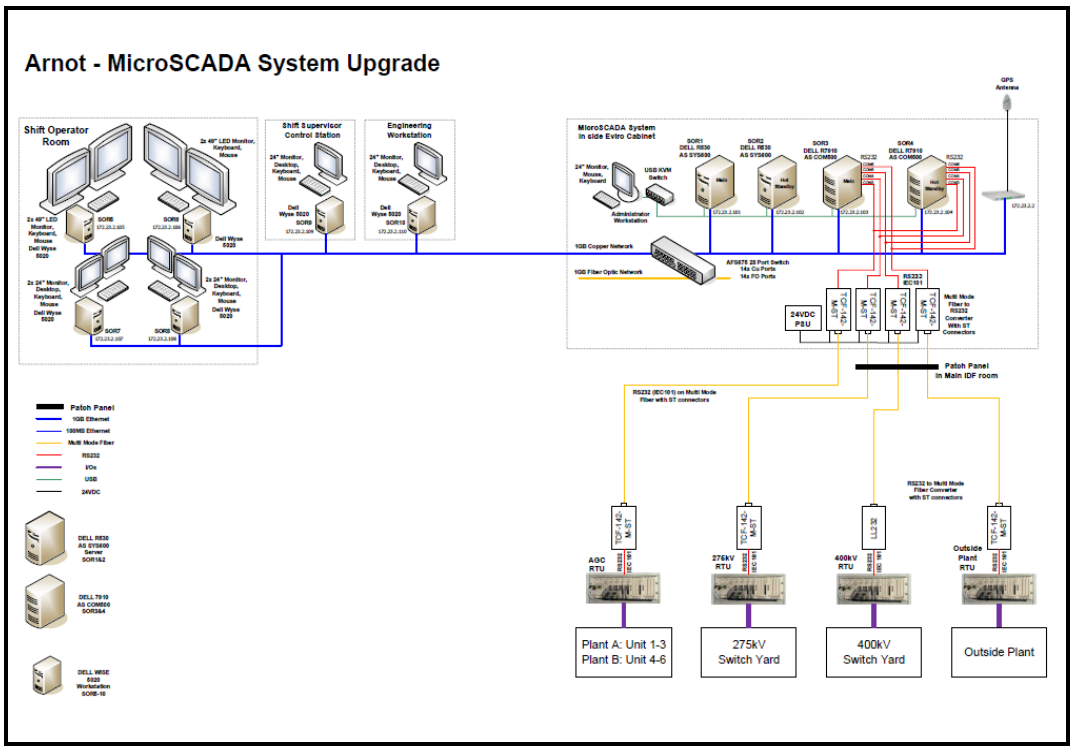

Figure 1: Overview of the Hitachi Energy MicroSCADA Control System (Existing)

4.1 The AGC RTU

The AGC RTU receives signals from National Control via the Bandwidth Management Equipment (BME) located at the High Voltage (HV) Yard. The command signals are routed from the BME to the AGC RTU via a multimode fiber optic cable as described in Section 4.1.5 (HV Yard BME Panel). From the AGC RTU, signals are hardwired to the ABB P14 Unit DCS via the Intermediate Distribution Frame (IDF). The communication between the AGC RTU and the Units DCS is one directional. This means that commands from National Control to the Unit DCS are sent from the AGC RTU to the Unit DCS but no signals are sent back from the Unit DCS to the AGC RTU.

4.1.1 ABB P14 Unit Control DCS System

The Units DCS executes the commands from National Control or from the Unit Controller via the AGC RTU. It is responsible for ramping the loads of the units up or down as per the request from National Control or the Unit Operator.

4.1.2 Generator Plant A and B RTU

The Generator Plant A and Generator Plant B RTUs are connected to the Hitachi Energy MicroSCADA via the AGC RTU using the IEC 60870-5-101 networked protocol.

4.1.3 The Concentrator (Main RTU)

The three RTUs, namely the AGC, Generator Plant A and Generator Plant B uses ESTEL protocol to communicate with each other, however they communicate with the Hitachi Energy MicroSCADA as well as the BME using IEC 60870-5-101 as per 240-61478967 and 240-61478980 standards. So there is a cubicle between the cubicles of the AGC RTU and those of the Generator Plant A and B RTUs which is called the Concentrator. This cubicle has one IST Card and a power supply. Its purpose is to translate ESTEL to IEC 60870-5-101 and vice versa. The new RTUs will be required to be compatible to the IEC 60870-5-101 protocol and therefore, the existing concentrator will not be required.

4.1.4 HV Yard BME Panel

Information is sent from the National Control Centre to Arnot Power Station AGC RTU via the Bandwidth Management Equipment (BME) that is located at the HV Yard. A patch panel for a fiber optic is installed on the 400kV ERTU located in the 400kV Relay House at the HV Yard which interfaces the BME to the AGC RTU located at the IDF Room (Main Building, Second Floor) at Arnot Power Station.

Information is transferred in both directions between the BME and the AGC RTU. This is done via a software and hardware interface utilizing the IEC 60870-5-101 protocol.

4.1.5 Power Supplies

The current RTUs are powered from redundant 220 V AC power supplies. They source directly from a Distribution Board (DB) adjacent to the RTUs located at the IDF room. The DB sources the power from the two of the units' Uninterruptible Power Supplies (UPS) located at two different equipment rooms (EDS 123 and EDS 456).

4.1.6 C&I Rooms

The *Employer* provides the following C&I rooms:

1. Existing u equipment rooms
2. Existing control room

The following is provided by the *Employer* for the existing unit equipment rooms:

1. DCS
2. Redundant UPS
3. Battery Chargers

The *Employer* provides HVAC system for the equipment, control and computer rooms.

4.1.7 Earthing Point

The station earth point is provided by the *Employer.*

4.1.9 Parts of the works which the Contractor is to design

The *Contractor* provides the whole of the *works* as defined in section of the Works Information except where explicitly stated otherwise.

5 High Level Scope of Work

The scope includes:

1. This specification covers the design, engineering, manufacture, assembly, testing and inspection, packing and delivery to site, installation, commissioning, site acceptance of the AGC, Generator Plant A and Generator Plant B RTUs for Arnot Power Station
2. The *Contractor* supplies the RTUs as per the Works Information.
3. The design, material and manufacture of the equipment by the *Contractor* is of the highest order to ensure continuous plant operation based on the availability, maintainability and equipment life cycle specified in Section 3.2.4 over its maintenance life cycle.
4. The *Contractor* replaces the obsolete AGC RTU with the latest intelligent controller that is compatible with the existing Hitachi Energy MicroSCADA, the existing BME System at the HV Yard which interfaces to the RTU and the existing ABB P14 DCS.
5. The *Contractor* provides temporary cabling for changeover purposes associated with the three RTUs, which includes field cabling and fibre optic communication cables for networking.
6. The *Contractor* provides, software and hardware interfaces of the AGC RTU to the existing ABB P14 DCS, Hitachi Energy MicroSCADA, Generator Plant A RTU, Generator Plant B RTU and the BME system at the HV Yard.
7. The *Contractor* provides software and hardware interface of the Generator Plant A RTU and Generator Plant B RTUs to the Hitachi Energy MicroSCADA to the Generator via the IDF.
8. The *Contractor* conducts the Factory Acceptance Test, the Site Acceptance Tests and Site integration Tests for the AGC RTU, Generator Plant A RTU and Generator Plant B RTU.
9. The *Contractor* ensures that the complete design is performed by an ECSA registered professional engineer/technologist and certified competent by the RTU OEM for each discipline as required by the scope of the design.

5.1.1 General requirements

1. The Works Information gives requirements for the system architecture, communication methods, and reliability and redundancy requirements of the AGC RTU, Generator Plant A RTU and Generator Plant B RTU. Included as well are interfacing requirements to the existing Hitachi Energy MicroSCADA, the BME at the HV Yard and the P14 Unit DCS system for units operation and control in line with the requirements of the Generation AGC Design Standard for Power Plants standard (240-119416400).
2. This Works Information covers the design, engineering, manufacture, inspection and testing at the manufacturer's works, supply, packing and delivery to site, unloading, storage and in plant transportation at site, erection, supervision, pre-commissioning and testing, commissioning and performance testing of the RTUs, along with associated control system components and devices specified herein.
3. It is not the intent of this Works Information to completely specify all details of the design and construction, but to give broad sizing and quality criteria for the major components, equipment and systems necessary to meet the functional requirements of the *Works*.
4. The general requirements covers the following activities and services in respect to all equipment and *works* specified in various sections of this specification:
    a. The workmanship is of the highest quality and conforms to all applicable quality standards of the Original Equipment Manufacturer (OEM) and the *Contractor*.
    b. All hardware components provided by the *Contractor* as part of this works conforms to the latest products based on industry standards.
    c. Basic Engineering of all equipment and equipment system(s) is performed by the *Contractor*.
    d. Detailed design of all the equipment and equipment system(s) is performed by the *Contractor*.
    e. Providing engineering drawings, data, instruction manuals, as built drawings and other information for the review, approval and for records.
    f. All items and equipment though not specifically mentioned in this Works Information but is needed to complete the system to the intent of the Works Information is included in the scope of the *Contractor*.
5. This Works Information contains minimum hardware and software requirements. However, the *Contractor* provides hardware and software configuration equal or above the installed RTUs to meet the technical, functional, performance, availability, maintainability and reliability requirements, and provides a complete solution.
6. The design and manufacturing of the RTUs is by the *Contractor* in accordance with the applicable codes, standards and requirements mentioned in the Works Information.
7. The RTUs provided by the *Contractor* have the following features:
    a. The RTUs is of proven design and suited for power plant operation and control.
    b. The RTUs is of modular design and scalable. This is to allow for the expandability and addition for new control modules, for increased control capacity. For example, power supply modules, CPU modules, communication modules, communication interface modules and modules for Input / Output purposes must be expandable.
    c. The RTUs are capable of high speed communication and are able to communicate with multiple sub-RTU, IED's and the Hitachi Energy MicroSCADA.
    d. The RTUs rack is of IP66 rating or higher.
    e. The RTUs allows for multiple signal types.

f. The RTUs modules is hot swappable.

g. The RTUs are designed around microprocessor based technology.

h. For ease of maintenance the control architecture supports pluggable modules on the backplane.

i. The *Contractor* terminates the field wiring such that they are easily detachable from the IO modules.

8. The *Contractor* takes full responsibility of the entire design and engineering and ensures a fully workable solution is implemented and proven. All designs and engineering are reviewed and approved by the RTU OEM design authority and the registered professional engineer of the *Contractor*, as per the Engineering Profession Act, 2000 (Act 46 of 2000), before submitting to the *Project Manager* for acceptance.

5.1.2 Basic RTU Functions

1. The RTU control system performs all the control functions necessary for the operation and control as per the existing RTU systems for the AGC, Generator Plant A and Generator Plant B. In addition, all functional capability described herein is provided by the *Contractor,* and designed to form a holistic control solution.
2. The basic functions of the RTU as provided by the *Contractor* consists of the following points as a minimum:
   a. The CPU of the RTUs is redundantly configured.
   b. The power supply of the RTU is redundantly configured.
   c. Redundant 220V AC Power Supply Modules.
   d. The communication of the RTU is redundantly configured.
   e. The RTU performs all analogue and binary data acquisition, control processing and commands for actuation.
   f. The RTU is capable of data acquisition and signal exchange through various instruments, transmitters and hardwired interfaces having different signal ranges as specified in AGC STD as per the following modules:
      i. Binary signals.
      ii. Digital Input Modules.
      iii. Digital Output Modules.
      iv. Analogue Input Modules.
      v. Analogue Output Modules.
   g. Receiving and processing of digital and analogue commands and communication from the Hitachi Energy MicroSCADA, for the operator supervision, control, monitoring and alarming.
   h. Control communication between the RTUs and the Hitachi Energy MicroSCADA.
   i. Support for IEC 60870-5-101/104, IEC 61850 protocols and the ability to meet the interface requirements of the existing design at Arnot Power Station.
   j. The RTU is time synchronized by National Control Centre.
3. The *Contractor* conforms to The South African Grid Code - The Information Exchange Code

5.1.3 Availability, Maintainability and Equipment Life Cycle

5.1.3.1 Availability

1. The *Contractor* designs the RTU control systems to provide a high degree of safety as well as availability. This would reduce the risk of control system failures and loss of production. The *Contractor* designs the RTUs to have an availability of greater than 99.99%.
2. Therefore, to ensure this degree of availability, the *Contractor* fabricates, assembles and finishes with the highest production quality and conforms to all applicable quality control standards. Nonetheless, the *Contractor* uses the manufacturer's standard designs to the fullest extent possible.
3. The *Contractor* includes software updates and upgrades for planned and unplanned maintenance as part of the availability calculations. The *Contractor* puts emphasis on online maintenance of RTU control system components for hardware upgrades.

5.1.3.2 Maintainability

1. The *Contractor* provides documentation necessary for the support and maintenance of the RTUs control system. This is to facilitate the operation and repair of the RTUs.
2. Although periodic preventative maintenance activities may be required for the upkeep of the RTUs, the *Contractor* designs the RTU systems so that any such work is performed without the need to de-energise networks of the associated control circuit. Therefore, to facilitate maintenance activities, a modular design shall be used by the *Contractor*.

5.1.3.3 Equipment Life Cycle

1. The *Contractor* provides RTU control systems that have life cycle of at least 15 years from the date of Completion.
2. The *Contractor* makes available, at no cost to the *Employer*, the manufacturing designs, technical drawings and the rights to manufacture any sub-assemblies that the RTU OEM will not support or discontinues to support during the life cycle of the RTU equipment.

5.1.4 Changeover Implementation Methodology

1. The AGC RTU, Generator Plant A RTU and Generator Plant B RTU are critical to power plant operation, and plays an important role in the operation and control of the units. Due to the criticality of this plant, the design and implementation by the *Contractor* during C&I plant construction and commissioning requires careful planning and preparation. This is especially viewed from the perspective of maintaining plant operations during the RTU implementation, minimising plant downtime and on ensuring that the production process is not impacted because of the implementation of the plant modification.
2. In cases where plant outages are required, the *Contractor* conducts the necessary planning and submits it to the *Project Manager* for acceptance.
3. The *Contractor* achieves and maintain high plant availability, reliability and safety during installation, commissioning and change over.
4. The *Contractor* integrates all stakeholders of the *Employer* for the planning and development of an integrated changeover implementation plan. The *Contractor* includes the following as a minimum which is submitted to *Project Manager* for acceptance:
    a. **The strategy for implementation. Such as**:

i. The implementation strategy is well planned and executed.

ii. The strategy for field implementation (field wiring concept, marshalling concept, trunk cable concept). Pre-outage installation criteria and work.

iii. The strategy for change of RTU control systems (maintaining of control function of plant areas during installation of the first unit). The RTUs replacement strategy is implemented in phases, ensuring operation of existing plant and minimise plant downtime.

iv. ii. The strategy for the BME, DCS and MicroSCADA implementation. Pre-outage installation criteria and work.

v. The strategy of the equipment downtime describes the requirements and various implementation options.

b. Planning

i. The *Contractor* develops a complete RTU modernisation plan. This plan consists of a changeover strategy and details RTU designs, the constraints to take into consideration and the outage requirements.

ii. The Contractor takes into consideration the *Employer's* operational and management requirements.

c. Changeover

i. Control System (RTUs) Changeover – is the process of putting the pre-configured and pre-wired new control systems online and taking over the control and monitoring functions of the plant from the existing RTU control system. The changeover includes the installation of the interfaces from the field devices to the RTU control system, the interfaces between the RTU control systems and the DCS control systems on the units, the interface to the MicroSCADA and the interface to NC systems. This includes all of the RTU control systems commissioning and site acceptance tests.

ii. The *Contractor* compiles the commissioning procedures and gives particular attention to the changeover process and planning to ensure the changeover is done safely, with no plant damage or plant production losses.

iii. The *Contractor* submits the changeover procedure to the *Project Manager* for acceptance 21 days prior to the start of the plant-commissioning period. The changeover procedure includes contingency procedures with timeframes and associated risks to restore plant operation to the RTUs should the changeover fail. The AGC RTU is common to all six Units and its changeover is not linked to Unit outages.

iv. The *Contractor* changes over the AGC RTU system such that there is only loss of visibility per I/O card of the AGC RTU to National Control.

v. The *Contractor* plans his changeover of the AGC RTU system such that the AGC RTU will run in parallel with the existing AGC RTU before and during changeover.

vi. The *Contractor* makes provision to revert back to the existing AGC RTU within the allocated time for commissioning of the AGC RTU or subsystem of the RTU when it becomes apparent that the RTU control system changeover would not be successful within the allocated time or when faults occurs that requires resolution by the *Contractor*.

vii. During the RTUs changeover planning, the *Contractor* determines the best changeover path, meeting the requirements of the *works*, and clearly documents

how the *Contractor* meets the change over time allocation for each of the RTUs in consultation with the *Supervisor,* and the *Contractor* submits the changeover Package for the acceptance by the *Project Manager.*

viii. The *Contractor* takes into consideration the impact on the MicroSCADA servers and HMI systems, the operation of the existing plant areas not forming part of the changeover scope but that are impacted by the changeover. The considerations are compiled in the changeover plan and procedure and submitted to the *Project Manager* for acceptance.

ix. For the intervals between the phased individual RTU changeovers for the various plant areas, the *Contractor* provides all the temporary hardwired and networked interfaces to the existing control systems to maintain the original plant control and monitoring throughout the changeover.

x. For the intervals between phased individual control system changeovers for the various plant areas, the *Contractor* provides all the temporary power supply cables and circuit breakers to power all the temporary installations to allow for a smooth changeover.

xi. The final arrangements and requirements of the *Contractor* shall be made with the *Project Manager* 72 hours in advance of the start of a particular plant-commissioning and Site Acceptance period.

5.1.4.1 AGC Changeover Strategy

As the changeover strategy, the *Contractor* provides an online changeover for the AGC RTU as follows:

1. The *Contractor* runs the newly installed AGC RTU in parallel with the existing AGC RTUs before changeover.
2. The *Contractor* reuses all cables from the IDF to all three (3) the RTUs.
3. The *Contractor* keeps and reuses all the four (4) RTU Cubicles for the entire *works.*
4. The *Contractor* keeps and reuses the installed termination Krone blocks in all the RTU Cubicles.
5. The *Contractor* installs the AGC RTU and its input/output cards in the space available at the bottom of the AGC RTU Cubicle as specified by the *Supervisor*.
6. The *Contractor* supplies, pulls and terminates a temporary 220V power supply cable from the 7 in 1 Control Room to the IDF Room to power the RTUs.
7. The *Contractor* connects the AGC RTU to National Control in parallel to the existing *Employer's* AGC RTU as follows:
   a. The *Contractor* powers the installed AGC RTU using the temporary power cables pulled from the Control Room as specified in Section XXXX.
   b. The *Contractor* connects the installed RTU to the BME at the HV Yard using the spare wires of the existing multimode fibre cable that connects the existing AGC RTU to the BME.
   c. The *Contractor* terminates the spare wires of the multimode fibre cable in (b) on a port on the BME provided by the *Employer* to connect the AGC RTU to National Control. or use a multi-drop connection.
8. The *Contractor* connects and commissions the interface between the AGC RTU to the Hitachi Energy MicroSCADA.

9. The *Contractor* conducts the Site Acceptance Test for the AGC RTU and demonstrates the successful completion of the SAT and submits the executed commissioning and SAT documentation for the acceptance by the *Project Manager*.
10. The *Contractor* simulates all signals from the IDF (Field Signals) to the AGC RTU and confirm that the response is as expected by the *Supervisor.*
11. The *Contractor* simulates all signals from the AGC RTU to the ABB P14 DCS and confirm that the response is as expected by the *Supervisor*. .
12. The *Contractor* simulates all signals from the AGC RTU to National Control and confirm that the response is as expected by the Supervisor..
13. The *Contractor* simulates all signals from the AGC RTU to the Hitachi Energy MicroSCADA and confirm that the response is as expected by the Supervisor.
14. The *Contractor* simulates all signals from the Generator Plant A and B RTUs to the AGC RTU and confirm that the response is as expected by the *Supervisor*.
15. The *Contractor* has to demonstrate the successful completion of the above tests as proof that the system is fully functional as per the philosophy of the existing RTU system, including the documentation which is submitted to the *Project Manager* for acceptance.
16. The *Contractor* performs the actual changeover from the existing AGC RTU to the AGC RTU forming part of his w*orks* as follows:
    a. The changeover from the existing to the RTU control system by the *Contracto*r is done per I/O Card.
    b. The *Contractor* disconnects the first card from the existing AGC RTU. Using the krone block corresponding to the card that has been disconnected, the *Contractor* connects the signals related to this card on the other side of the Krone block and connect these signals to the installed RTU control system.
    c. The *Contractor* performs a functional test on the RTU control system to verify if the signals of the relevant card have been migrated successfully.
    d. If the signals have been demonstrated to the *Supervisor* as having been migrated successfully by the *Contractor*, the *Contractor* repeats the above procedure with the next set of cards and its signals until all the signals for the existing AGC RTU are fully immigrated to the AGC RTU control system.
    e. If the migration of signals from a specific card is unsuccessful, the *Contractor* reverts back to the existing AGC RTU by disconnecting the signals from the krone block to the RTU control system and re-inserting the I/O card corresponding to these signals on the existing AGC RTU.
17. At the successful completion of the AGC RTU changeover as per the changeover procedure and supporting documentation witnessed by the *Supervisor* the *Contractor* submits the commissioning and SAT documentation to the *Project Manager for acceptance*
18. *T*he *Contractor* decommissions, removes, stores and packages the existing AGC RTU control system and I/O modules and hands them to the *Project Manager for acceptance through a document transmittal* .
19. The *Contractor* relocates the CPU & I/O Cards and the patch panel from the main RTU Cubicle to the top of the AGC RTU cubicle where the existing AGC RTU has been removed by the *Contractor*.
20. The main RTU Cubicle will be empty and available for the installation of the Generator Plant RTUs by the *Contractor*.

21. The *Contractor* installs the Generator Plant RTUs and its modules in the Main RTU Cubicle.
22. The *Contractor* follows the same process used to changeover the AGC RTU to changeover the Generator Plant RTUs.
23. At the Completion of the Changeover of the RTUs, the *Contractor* decommissions the existing d RTUs and hand them over to the *Project Manager* for use as spares at other power stations.
24. The *Contractor* connects all the RTUs that constitute the *works* to the *Employer's* permanent power supplies Circuit Breakers that were used by the existing AGC RTU, Generator Plant A RTU and Generator Plant B RTU.

5.1.5 C&I SPECIFICATION OF THE WORKS

1. The *Contractor* designs each RTU system to be fully redundant and to operate independently from the others. This is required to mitigate control system failure of the AGC, Generator Plant A and Generator Plant B RTU Systems.
2. The *Contractor* interfaces to the existing Hitachi Energy MicroSCADA via the RTU systems to meet functional and operational requirements as described below.
3. The *Works* can be broadly divided into the following parts:
    a. Decommissioning of the existing AGC RTU, Generator Plant A RTU and Generator Plant B RTU, all obsolete systems, equipment and components.
    b. The design, engineering, manufacture, inspection and testing at the manufacturer's works, supply, packing and delivery to site, unloading, storage and in plant transportation at site, erection, supervision, pre-commissioning and testing, commissioning and performance testing of the RTUs, along with associated control system components and devices specified herein to provide a fully functional system.
4. The *Contractor* performs all engineering for software and hardware interfaces to the Hitachi Energy MicroSCADA, HMI configuration, the P14 Unit DCS, the BME for National Control and system archiving functions to meet the operational and functional requirements of the scope.
5. The existing AGC RTU, Generator Plant A RTU and Generator Plant B RTU consist of the following functions components and interfaces which are monitored on the Hitachi Energy MicroSCADA and the P14 Unit DCS (AGC):
    a. Interface to National Control centre
    b. Interface to Standby National Control centre
    c. Interface to Hitachi Energy MicroSCADA
    d. Interface to the Unit ABB P14 DCS
6. The *Contractor* integrates the technical schedules, wiring diagrams and other applicable engineering documents and proposes complete functional RTU replacement solutions to meet the requirements of the *Works*.

5.1.5.1 Design of Control System Equipment

1. The *Contractor* is responsible for the Design, Engineering of Hardware and Software Engineering, its Configuration, Commissioning and Testing of all equipment forming part of the *Works* and interfaces to existing control system to ensure a fully functional system.
2. The *Contractor* provides all equipment, services and executes all work in accordance with the requirements specified in the Works Information.

3. The *Contractor* is responsible for all system interfaces, and modifications required to interface with existing plant (such as the Hitachi Energy MicroSCADA and external interfaces forming part of the Scope of Work).
4. The *Contractor* engineers the RTUs control and monitoring solution as a fully operational system and implement it in a consistent and integrated manner.
5. The number of redundant RTUs required and their physical and functional distribution is designed and optimized by the *Contractor* to achieve functional distribution and redundant communication paths to minimise the effects of equipment failure on the overall plant.
6. The *Contractor* supplies engineering documents in accordance with the Vendor Document Submittal Schedule (VDSS) as contained within the Appendix 5.
7. The design applies to both Hardware and Software Engineering Functions and the Functional requirements for meeting the requirements of the AGC RTU, Generator Plant A RTU and Generator Plant B RTU Works Information.

5.1.5.2 Backups and Licencing

1. The *Contractor* provides the backup and configuration files of the RTUs and all associated software, such that future changes and modifications can be conducted on site by the *Employer*'s personnel.
2. Relevant & related software is loaded on all of the *Employer*'s maintenance computers by the *Contractor*.
3. Licenses required for access to software will be paid on a once off basis by the *Employer*.
4. It is required that no licenses will be required for the remainder of the life span of the equipment. Software updates and software patches will be made available to the *Employer* by the *Contractor* whenever the need arises at no additional cost.

5.1.5.3 BME at the HV Yard

1. The *Contractor* is responsible for any configurations that are required to the BME to provide a fully functional system forming part of the *Contractor*'s scope as per the *Works*, in the equipment room at the HV yard, to which the AGC RTU interfaces.

5.1.5.4 Field Equipment and Cabling Requirements

1. Replacement of instrument and trunk cabling is not part of the scope of the project
2. The *Contractor* reuses all field cabling from the plant to the IDF
3. The *Contractor* reuses all cables from the IDF to the AGC RTU, Generator Plant A RTU and Generator Plant B RTU.
4. The *Contractor* reuses the existing cabling from the IDF to the marshalling panels, in which case the new marshalling cabinets shall be labelled and numbered exactly how the current system is labelled and numbered. This will allow the *Contractor* to terminate the trunk cables from the IDF to the new marshalling exactly as it was done in the old RTUs. This will ensure a smoother changeover due to the lack of proper documentation of the system.
5. The *Contractor* is responsible for disconnecting all cables from the old RTUs and termination of all cables on the marshalling of the new RTUs.
6. Where the installation of new cables are necessary between the IDF and the Marshalling cabinets of the new RTUs, the *Contractor* is responsible for disconnecting the old cables, safe disposal or storage of the old cables, installing, termination and testing of the new cables to ensure a fully functional system.
7. The *Contractor* reuses the existing RTU cubicles for this *Works*.

8. It is the responsibility of the *Contractor* to ensure that the baseline system is interfaced to the proposed equipment that the supplier intends to provide. Adequate protection for signal interfaces to be taken into account where multiple sub systems are interfaced.
9. The interface between the AGC RTU and the current ABB P14 Unit DCS remains hardwired.
10. The *Contractor* designs the new system to be compatible with the currently installed system at the HV Yard and that the existing fibre cables from the HV Yard to the AGC RTU at the IDF Room and its associated patch panels will be reused.
11. If new fibre optic cables and patch panels are required by the *Contractor* for a fully functional system forming part of the *Contractor*'s works then it is the responsibility of the *Contractor* to design supply commission and test the new fibre optic cables and patch panels.
12. The *Contractor* ensures that cables are securely mounted on process control racks permanently and that all fire seals which are damaged or broken in the process of the installation, are replaced or repaired wherever required.
13. Core drilling might be required in instances where new cubicles are required for the installation. The *Contractor* to ensure that all instances are taken into account to ensure compliance to site standards / regulations and procedures.
14. Where changes are required to the plant, this is to be brought to the attention of the *Project Manager* in writing without delay. All communication is to be directed to the project manager in all instances.
15. Scaffolding will be made available to the *Contractor* upon request. This request to be brought to the attention of the *Contract Manager* a week prior to use thereof.
16. All field equipment is installed with regard for the following:
    a. Passageways and the movement of people and equipment during maintenance activities
    b. Ergonomics and maintenance access to the equipment

5.1.5.4.1 Field Instrumentation

1. Replacement of field instrumentation is not part of the scope of this project.

5.1.5.4.2 C&I and Power Cabling

1. All cabling and cable racking forming part of the *Contractor*'s scope adheres to 240-56227443: *Requirements for Control and Power Cables for Power Stations Standard*.
2. All cabling is suitably protected against mechanical damage, chemicals, dust build-up and heat.
3. Instrument cabling is defined as cabling between field instruments and Junction boxes.
4. Power supply cabling is defined as being cabling required to power field equipment, control modules, servers and HMI screens.
5. Instrument cables are routed separately from electrical power cables and crossovers that bring signal and power cables into close proximity are made at right angles.
6. The routes for power supply cabling and the racking are of a consistent and integrated design taking into account different cabling and racking routes for common modes of failure, and the redundancy concepts of the RTUs design.
7. The *Contractor* provides 20% spare installed capacity in all multi-core cables, rounded up.
8. The *Contractor* provides and installs cable numbers on all newly installed cables, as per the *Employer*'s specifications. Drawings are to reflect the cable numbers together with equipment KKS numbers.

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

1. All trunking, junction boxes, enclosures and racking forming part of the scope of the *Contract* has 20% spare capacity, rounded up.
2. All conduits forming part of the scope of the *Contract* have 50% spare space capacity, rounded up.

5.1.5.5 Power Supply Requirements

5.1.5.5.1 General Power Supply Requirements

1. The current RTUs are powered from redundant 220 V power supplies. They source directly from a Distribution Board (DB) adjacent to the RTUs located at the IDF room. These DBs source their power from the units' Uninterruptible Power Supplies (UPS) located at EDS 123 and EDS 456. The *Contractor* supplies new RTUs that are compatible and can readily use the available 220V power supplies at the IDF room.
2. The *Contractor* provides the cables, circuit breakers and all other equipment necessary to connect the new RTUs to the Distribution Boards at the IDF Room.
3. The *Contractor* provides all power supply requirements as required for the RTU replacement design during the tendering stage. This includes power supply for all RTU components and devices, forming part of the RTU system.
4. The *Contractor* confirms in writing during the tendering stage that his system is compatible to the power supplies provided by the *Employer.*
5. A high level of reliability of the power distribution system forms the basis of the design for all hardware components by the *Contractor*. No single point of failure shall affect the performance and reliability of the RTU control system, and shall not affect the performance of the Unit. Therefore, the detailed design by the *Contractor* considers sufficient power supply segregation in order to maintain supply availability to the RTU, its components and devices.
6. The *Contractor* designs the RTUs power distribution in a redundant manner, fed from UPS supply for AC systems.
7. The *Contractor* supplies the power distribution circuits by appropriately sized circuit breakers, giving thought and rationale to power supply distribution, segregation and diversity.
8. The *Contractor* is responsible for the supply of all power supply loading requirements, providing detailed load calculations, distribution panel circuit breaker sizing and power calculations for both AC and DC systems forming part of the RTU systems.
9. As a minimum, the following forms part of the *Contractor*'s power distribution design:
    a. Size type and response of protection devices used within the AC and DC power circuits.
    b. Distribution cable sizing.
    c. Circuit breaker sized appropriately (i.e. consideration for in rush currents on system start-up).
    d. Short circuit and overload conditions and protection.
    e. Earthing, Lightning, and electrical protection.
10. The *Contractor* uses Redundant Power Supplies for the RTU system, where redundant supplies are fed from the redundantly configured UPS supplies for AC systems.
11. The *Contractor* powers networked components (such as switches forming part of the RTU system) from redundant supplies.
12. The *Contractor* configures networked components for the monitoring of equipment health, where the alarms generated by the hardware proxy of the equipment are either alarmed via the network,

or by configuring a hardware contact alarm of the equipment (common alarm). This is wired to the RTU control system for monitoring and alarm.

5.1.5.5.2 Earthing, Lightning and Electrical Protection

1. The *Contractor* implements the correct earthing concept for reliable operation; this concept is submitted to the Project Manager for review and acceptance.
2. All earthing concepts by the *Contractor* follows as a minimum the OEM best practices and 240-56356396 "*Earthing and Lightning Protection Standard"* to ensure safe and reliable operation.
3. The integrity of the earthing system is tested by the *Contractor* in the presence of the *Employer* upon completion of the C&I and Electrical installation to ensure compliance.
4. The *Contractor* supplies equipment as part of his design that is immune to electromagnetic interference according to internationally accepted EMC standards for power plant.

5.1.5.6 RTU Interfaces

5.1.5.6.1 Interface to Hitachi Energy MicroSCADA

1. The Hitachi Energy MicroSCADA control system at Arnot Power Station controls the Electrical Balance of Plant as shown in **Error! Reference source not found.** The existing RTUs provide control and monitoring functionality of the AGC, Generator Plant A and Generator Plant B.
2. The *Contractor* provides a networked interface for communication, control and monitoring of the new AGC RTU, Generator Plant A RTU and the Generator Plant B RTU functions to create a seamless, and fully functional and operational new RTU installation.
3. The functions included are, but are not limited to these (according to the detailed design requirements):
   a. Configuration of all control and monitoring signals according to the RTUs database (see the Appendix 2), and is used within the Hitachi Energy MicroSCADA for the control, monitoring and archiving of the automation system process control variables.
   b. In principle, the RTU replacement solution preserves the existing control and operational philosophy of the plant, and its interface to the Hitachi Energy MicroSCADA. The solution by the *Contractor* provides compatible devices and technology to integrate seamlessly into the Hitachi Energy MicroSCADA system.
   c. The *Contractor* provides all equipment, design and engineering to ensure compatibility and operability of all interfaces to the Hitachi Energy MicroSCADA, and ensures that all legacy protocols or new communication protocols as required by the interface are provided within the RTUs solution.
   d. The *Contractor* ensures that all operator and HMI interfaces as governed by the existing RTU systems is provided for by the new RTUs.

5.1.5.6.2 Interface to ABB P14 DCS

1. The AGC RTU have a hardwire interface to the ABB P14 DCS.
2. The interface is kept "AS IS" and no modifications are expected on the hardwire interface or any software configurations on the DCS.
3. However should the *Contractor* require modifications on the hardwired interface including software configurations on the DCS to provide a fully functional system forming part of his works, the *Contractor* shall be liable for subcontracting ABB South Africa PTY LTD or an approved ABB sub-contractor to effect such changes. The *Contractor* indicates during the tendering stage of any

changes required on the ABB P14 DCS to provide a fully functional systems as per the *Contractor's* scope of work.

5.1.5.6.3 Interface to National Control

1. The AGC RTU interfaces to National Control and Standby National Control via the BME located the HV Yard using the IEC 101 protocol.
2. The *Contractor* uses the existing infrastructure to interface the newly installed AGC RTU to the National Control Centre and Standby National Control Centre.
3. As per the changeover requirements stipulated in Section 3.2.5, the *Contractor* may need to setup a temporary interface to allow for a smooth changeover. In this case, the *Contractor* provides all necessary equipment including software configurations at the BME. The *Contractor* indicates and cost for all interface requirements for the AGC RTU and National Control during the tendering stage.

5.1.5.6.4 Interface to the Station Historian

1. The existing Station Historian acts as a central but secondary point of information storage, where information from the various control RTU's are stored.
2. The *Contractor* is responsible for sending information from the new RTU to the Station Historian, via a redundant OPC link.
3. The *Contractor* provides all necessary hardware and software to perform this function.
4. The *Contractor* uses redundant equipment (e.g. OPC servers) to ensure that there is no single point of failure in communications, and is protected against both hardware and software failures.
5. The *Contractor* provides the required network infrastructure (e.g. fibre optic cables, all infrastructure requirements, software and configuration requirements) and engineering of the RTU's to perform this function for the OPC link. Features of this link shall as a minimum consist of:
   a. Reliable Data Transfer.
   b. Hardware and Software Redundancy.
   c. Automatic switchover.
6. The engineering and configuration necessary on the existing Station Historian is provided for by the *Contractor*. The infrastructure requirements, software and configuration requirements on the Station Historian to be able to accept this information is provided by the *Contractor*.

5.1.5.7 Time Synchronisation

1. The RTUs are time synchronized by the National Control Centre. Accurate time stamping of all IO variables shall be performed by the RTU, which shall be used for control processing, and for archiving functions and shall chronologically perform processing of data.
2. The link to the time server is provided at the station level using Network Time Protocol (NTP).
3. The *Contractor* designs the link to the time server to minimise latency and ensures RTUs are time synchronized to a 1ms accuracy.
4. Time stamping of events is done by RTUs with a resolution of 1ms.

5.1.5.8 The *Contractor* designs the AGC RTU such that a turnaround time of 4ms between National Testing and Commissioning Requirements

5. As a minimum the *Contractor* adheres to the minimum requirements as set forth by IEC 62381 (Automation Systems in the Process Industry - Factory Acceptance Test (FAT), Site Acceptance Test (SAT), and Site Integration Test (SIT)).

6. The *Contractor* is responsible for the correct configuration, design and proper performance of the RTU control system, its equipment and component systems. These shall be performed in accordance with the quality assurance procedures established for this project.
7. All control system components shall be inspected, tested and commissioned.
8. All calibration equipment used for the calibration and testing of systems shall be accredited. The accuracy of the testing and calibration equipment shall be of a higher order than that of the equipment being calibrated. Accreditation proving documentation for all calibration equipment shall be provided by the *Contractor* upon request from the *Employer.*
9. The *Contractor* submits detailed procedures for all running tests, including acceptance criteria for all monitored parameters to the *Employer* for review and comment at least six weeks before the first scheduled tests takes place.
10. Prior to delivery to site of the RTUs and its components, a Factory Acceptance Test (FAT) is conducted by the *Contractor* at his premises and witnessed by the *Employer*'s representative/s for final acceptance and release to deliver. The *Contractor* provides notification of the FAT at least one week in advance. A Site Acceptance Test (SAT) is also necessary. A detailed list of signal to be tested will compiled and the provision to ensure that the IEC61850 protocol is tested during FAT.
11. Downtime of the RTUs is minimized during the change-over from the existing RTUs to the new RTUs, as far as is practically possible, by taking precautionary measures and providing detailed risk assessments with mitigations to the *Employer'*s representative. Total downtime of no more than five days will be accepted. Signals from the units may be changed over on a sequential or unitized basis to reduce the downtime.
12. Functionality of the AGC RTUs shall be tested, confirmed and accepted by NC according to the following two Eskom procedures (obtainable on request):
    a. TEMSE IEC 60870-5-101 Implementation.
    b. TEMSE AGC Functional Description.
13. The *Contractor* will be requested as a pre-requirement to test the functionality of the supplied equipment with National Control. If the *Contractor* so wishes to test their equipment the *Employer*'s *Contract Manager* can be contacted. The *Employe*r's representatives is responsible for liaising with National Control for the test to be conducted and thus approval granted. If the *Contractor* has already tested the equipment and approval has been granted this can be submitted as part of the tender enquiry. The test will be done to ensure that communication of the 32-bit string code is adhered to and the times specified for transmitting and receiving of signals are met. The importance of the test is to ensure that the final installation is a workable proven solution.

5.1.5.9 Decommissioning, removal and disposal of the existing RTU

14. The *Contractor* decommissions, removes and hands over all modules, cards and power supplies to the *Employer*, for use as spares on other AGC RTU installations. The modules removed from existing plant are packaged into anti-static material and boxed adequately. This will be documented in a list and handed to the *Employer*'s *Project manager* for acceptance.
15. Where it is necessary for temporary settings to be established to changeover from the existing RTUs to the new RTUs to meet the changeover requirements as stated is Section 3.2.5, the *Contractor* is responsible for the provision of all equipment necessary to allow a smooth transition from the old equipment to the new equipment. This includes but not limited to temporary cubicles, cables and power supplies.

5.1.6 Electrical SPECIFICATION OF THE WORKS

5.1.6.1 GENERAL

For all electrical *Works* the *Contractor* shall:

a. Include in the *Works* extensive training on all aspects for the Engineering, Maintenance and Operating personnel.

b. Ensure that the *Works* are implemented as prescribed in the corresponding standards listed within this document.

c. All power supply cabling from the distribution boards to the RTUs is provided, installed and terminated by the *Contractor*.

d. Any cabling required in the installation is the responsibility of the *Contractor*.

5.1.6.2 TEMPORARY WORKS

The *Contractor* installs an MCB in the unit 3 MMI DB (30UCA30GF001) situated in the unit 3 control desk. The *Contractor* installs a double core cable of 500m in length. The cable is pulled from 30UCA30GF001 to IDF room new AGC or Generator RTU panels by the *Contracto*r. The RTUs have dual power supply input ports.

Upon completion of the RTUs changeover, the *Contractor* removes the newly installed power cable between Unit 3 MMI DB 30UCA30GF001 and AGC/Generator RTU panels. The *Contractor* removes the cable and hands it over to the *Supervisor*.

5.1.6.3 UPS'S AND BATTERIES

It is the responsibility of the *Employer* to provide the Uninterruptible Supplies (UPS) and batteries as well as the DBs for the supply of power to the new RTUs. The *Contractor* installs the required circuit breakers, size the cables from the DB to the RTUs, procure, install, terminate and test the cables to ensure a fully functional RTU system as per the requirements of this Works.

5.1.6.4 ELECTRICAL POWER CABLING

For the electrical power cabling the *Contractor* meets the followings requirements as a minimum:

The *Contractor* provides the detail design, supplies, installs, terminates, labelling, tests and commissioning of all cabling.

The *Contractor* decommissions/Disconnects the existing power supply cables from the DBs to the new equipment.

The Contractor removes the old cables and store them in the dedicated area selected by the *Employer.*

The *Contractor* issues a test certificate of compliance prior to commissioning of the cables

The *Contractor* provides durable cable numbering /labelling for all cables connected to the equipment, the numbering /labelling shall be such that maintenance on cables is easily achieved.

The *Contractor* secures all cables installed with suitable cable glands, straps or clamps on racks, control panels etc.

The *Contracto*r submits the cable schedules for all cables, inclusive of the origin, target, type, size and termination details to the *Employer.* The *Contractor* uses Template 240-56176097: Electrical Cable Schedule.

The *Contractor* provides AC power supply cables that are 4-core, PVC insulated power cable (copper conductor), with low halogen emission flame-retardant PVC outer sheath and bedding.

The *Contractor* provides DC power supply cables that have high conductivity, are flexible, flame retardant PVC insulated, stranded copper conductors.

The *Contractor* reuses existing cable routes and cable racks. If it is not feasible to use the existing racks, it is the responsibility of the *Contractor* to provide and install new racks.

On completion of the installation, the *Contractor* issues a Certificate of Compliance (CoC) as stipulated in SANS 10142-1 to the *Employer as* per the Occupational Health and Safety Act, (OHS Act 85 of 1993).

The *Contractor* provides the cabling in accordance with the following technical guidelines and specifications:

a. SANS 10142-1- Wiring Premises

b. 240-56227443 - Requirements for Control and Power Cables for Power Stations Standard.

c. 240-56176852 – Essential Power supplies for power station Standard.

d. 240-56356396 – Earthing and Lightning protection.

5.1.7 OTHER REQUIREMENTS OF THE *CONTRACTOR*'S DESIGN

5.1.7.1 Project Phases

16. The *Contractor* undertakes all phases of engineering and design from the investigating phase, system engineering & design through technical clarification, design freeze, procurement and production engineering to installation, commissioning and testing and addresses the following throughout the execution of the different project phases:

    a. The *Contractor* translates and incorporates all electrical, C&I and third party documentation onto the *Contractor*'s documentation to ensure an integrated documentation system.

    b. The *Contracto*r designs, engineers, commissions and tests of all interfaces forming of the *Contractor*'s scope of work

    c. The *Contractor* is responsible for the detailed engineering of the field interfaces and interfaces within the RTU control system, for both the hardware and software configurations.

    d. The *Contractor* strictly adheres to the plant outage duration's during changeover to within that specified in the Works Information. The *Contractor* puts emphasis on planning and up front work to achieve the prescribed outage times, prevent rework and damage to plants.

    e. The *Contractor'*s design and engineering takes into account the performance requirements as specified for the RTUs control system. In particular an integrated and working RTU control system is provided which meets safety, reliability, availability, operability and maintainability criteria, binary control, sequential control, protection functions, supervisory control functions, and information sharing functions.

    f. The *Contractor* provides the various documents during the various phases as per the Accepted Programme and Completion of each section of the works (each phase) as specified in the VDSS which is then submitted by the *Contractor* for acceptance by the *Project Manager*.

5.1.7.2 Investigation Phase

17. The *Contractor* together with the *Project Manager* clarifies all project management issues. The *Contractor* validates any documentation provided by the *Employer* for accuracy against the existing installation to enable the detailed engineering and design by the *Contractor* for the AGC RTU, Generator Plant A RTU and Generator Plant B RTU.

18. The *Contractor* benchmarks current plant operations regarding the RTUs control system performance and uses this information during the commissioning and acceptance test phases to

demonstrate to the *Project Manager* the successful translation of such information into the new RTUs control system.

19. The *Contractor* compiles the commissioning procedures and gives particular attention to the changeover process and planning to ensure that plant systems prescribed outage times for changeover are met, the changeover is done with no safety, no plant damage or plant production losses.
20. The available existing documentation and drawings as referred to in the VDSS is made available, by the *Employer*, to the *Contractor* to at Arnot Power Station.
21. There is no involvement of an intermediate engineering function and the *Contractor* works directly with the *Employer'*s personnel, in liaison with the *Project Manager*, for all technical matters.
22. The *Contractor*'s personnel are authorised for the LAR process at Arnot Power Station during the investigation phase. Before Completion of the investigation phase the *Contractor'*s personnel are authorised as Responsible Persons as defined in the Plant Safety Regulations at Arnot Power Station. This requirement for the *Contractor'*s Responsible Persons remains until the defects date or the end of the last defect correction period.
23. The documentation summary and drawing register is submitted to the *Project Manager* and acceptance is obtained as a prerequisite to Completion of the investigation phase.

5.1.7.3 System Engineering and Design Phase

24. During this phase the detailed design is done to ensure that all systems and sub-systems of the RTU control systems form an integrated and consistent whole, including verification of all interfaces, and the ability of these interfaces to create seamless connections to all systems.
25. In this phase all ground rules, design procedures, quality requirements, conventions, descriptions, symbols, representation of information in different categories and the method of finalising the power supply and related aspects, process operating and control philosophies, supervisory control, information sharing and alarming philosophies (plant and systems) are determined, by the *Contractor.*
26. All functional and performance requirements are translated, by the *Contractor*, into a conceptual design which the *Contractor* presents to the *Project Manager* for acceptance, before proceeding with the design part of this phase. Overall concepts are checked for validity and refined by the *Contractor*.
27. The *Contractor* does not start on any system-specific phases until this phase is completed, i.e. design freeze is obtained following technical clarification with acceptance by the *Project Manager.*
28. Once design freeze is obtained and the engineering concepts are accepted by *Project Manager*, the *Contractor* may start with the design.
29. During the design, all functional and performance requirements are translated into specific hardware and software designs by the *Contractor*.
30. On Completion of the system engineering and design phase, the *Contractor* presents the complete RTU control system design and the detail control, operating, alarming and information sharing philosophies to the *Project Manager* for acceptance. This is performed during formal clarification meetings arranged by the *Contractor* in accordance with the Accepted Programme.
31. Assistance to the *Project Manager* for this review and acceptance process is provided by the *Employer* and the *Contractor* ensures that these *Employer* activities are planned and included in the Accepted Programme.

32. The *Contractor* supplies three sets of the system engineering and design stage documentation to the *Project Manager* for acceptance at least 5 days prior to the start of the technical clarification discussions and it is shown in the Accepted Programme.

33. The system engineering and design stage documentation is in a logical format complete and prepared in conformity with the agreed documentation summary.

5.1.7.4 Technical clarification stage

34. During this stage the *Contractor* clarifies all technical issues with the *Project Manager* to enable the *Contractor* to proceed with fabrication of the equipment following design freeze.

35. The *Project Manager* is presented with the design and philosophy information for *Employer*'s review, acceptance and finalisation in the initial stage of this project stage.

As a minimum this includes:

a. System functional and performance specifications.

b. Detail control and operating philosophies.

c. Monitoring system equipment allocation & distribution.

d. Power supplies distribution

e. Communications and control system network(s).

f. Design to match functional, performance criteria both for the RTU control system.

g. Cabinet and cubicle layouts and locations. (Including ventilation and filtration specifications)

h. Hitachi Energy MicroSCADA interface design and database.

i. Operating displays and navigation.

j. Alarm/event handling.

k. Engineering system/station.

l. Diagnostic system/station.

m. Quality assurance and quality control measures and methodologies.

n. Interfacing and communication specifications.

o. Interfacing to field equipment (IDF).

p. All hardware and software interfaces.

q. Documented proposals of the factory acceptance testing (FAT), installation and commissioning procedures, Site integration testing (SIT), Site acceptance testing (SAT) both of the process control and monitoring system functions and performance as well as the plant processes operating and performance, operational testing.

r. Documented proposals of engineering, maintenance and operating documentation.

s. Documented proposals of engineering, maintenance and operating training manuals.

t. Project phasing, resources to meet availability requirements.

u. Changeover over strategies and roll out/ commissioning methodologies.

36. The drafts of all documentation for technical clarification are presented to the *Project Manager* at least 5 working days prior to the technical clarification meeting and it is shown in the Accepted Programme.

37. The *Contractor* is responsible for the identification and gathering of any information and data required for the design. Where the information required is not available, the *Contractor* is responsible for the collection or alternatively, the generation of the information.

38. The documentation control system, is presented by the *Contractor* to the *Project Manager* for acceptance at the technical clarification stage as a prerequisite to Completion of the technical clarification stage.

39. The *Contractor* submits the format, content and layout of all documents supplied as part of the works, to the *Project Manager* for his acceptance as a prerequisite to Completion of the technical **clarification stage.**

5.1.7.5 Design Freeze stage

40. In this stage the information from the technical clarification stage is presented to the Project Manager for acceptance by the *Contractor.*

41. The *Contractor* provides the following documentation within 5 working days of Completion of the technical clarification phase and it is shown in the Accepted Programme:

    a. All documents required, fully describing the functional and physical design of the works.

    b. Build-to specifications for all interfaces, hardware, application software, networks, power supplies, distribution, isolation facilities and earthing for the process control and monitoring system equipment.

    c. HMI displays, logs, database.

    d. Control, operating, alarming and information sharing documentation,

    e. Detailed project execution processes, i.e. installation, commissioning and changeover procedures and methodology.

    f. Proposed FAT, SIT, SAT and operational test procedures and methodologies. This covers both the requirements of the process function and performance parameters to be met as well as for the control and monitoring system functionality and performance.

    g. QA methodologies used both for the RTU control system.

    h. Quality control check-sheets and procedures.

    i. The Functional Design Specification (FDS), which includes the final performance, functionality and equipment specifications of the RTU control systems as compiled during the technical clarification phase.

    j. A summary of the outcome of all the technical clarification meetings.

    k. During this stage the format and content of all operating, engineering and maintenance manuals and drawings; and operating, engineering and maintenance training manuals is clarified and agreed.

42. Two first draft copies of operating, maintenance and engineering manuals and drawings are supplied by the *Contractor* five (5) days prior to Completion of the design freeze stage and *Project Manager's* acceptance is obtained as a prerequisite to Completion of the design freeze stage.

43. The *Contractor* obtains the *Project Manager* acceptance of the system engineering and design phase documentation as a prerequisite to Completion of the design freeze stage and prior to the commencement of work on the next project phase.

5.1.7.6 Production engineering phase

44. During this phase the *Contractor* completes all production engineering (engineering activities that translate the requirements finalised during technical clarification and design freeze into a fully operational system).

45. The following documentation is presented to the *Project Manager* at least ten (10) working days prior to factory acceptance testing and it is shown in the Accepted Programme:

    a. Two copies of the design documentation.

    b. Two copies of the relevant QA and QC documentation.

    c. Two copies of installation, commissioning and changeover and de-commissioning documentation.

46. Review and acceptance by the *Project Manager* does not relieve the *Contractor* of his responsibility for the correctness of the design and the ability of the works to satisfy the requirements of the Works Information.

47. Two copies of all other production engineering design documentation, prepared in conformity with the system engineering and design phase documentation, are issued by the *Contractor* to the *Project Manager* for acceptance at least ten (10) working days prior to the commencement of any procurement, fabrication, detailed design or construction and it is shown in the Accepted Programme.

5.1.7.7 Procurement and fabrication stage

48. The Contractor performs the proper co-ordination and execution of procurement, inspection, expediting, delivery and QC of all Plant, Materials and Equipment required to Provide the Works.

5.1.7.8 Factory acceptance testing (FAT) and delivery stage

49. Prior to the transportation of the RTU control system to Site, the system has to undergo Factory Acceptance Testing (FAT). With this test, the *Contracto*r demonstrates that the RTU control system meets all the requirements of the Works Information. The tests are witnessed by the *Supervisor* and Others (e.g. the *Employer*'s personnel and/or third party inspectorate).

50. The test procedure is compiled by the *Contractor* and presented to the *Project Manager* for acceptance during the technical clarification phase and it is shown in the Accepted Programme.

51. All hardware and software is available and fully operational before the FAT commences. Following the FAT the RTU control systems are run for a continuous period of 120-hours without any failure of hardware, software or functions. Simulated inputs are used for the tests. The *Contractor* performs a complete functional test of all the RTU control and monitoring systems, functions and capabilities before delivery to Site.

5.1.7.9 Factory Acceptance Testing Minimum Requirements

52. The facilities provided with the RTU control systems are used to monitor performance, diagnose states and to demonstrate functionality listed below. Each individual device and the RTU control systems as a whole are tested, using all the I/O for the conditions stated below:

    a. RTU control systems functions, performance, card fail over tests.

    b. Power supply functions, performance, failure handling.

    c. Control and Communication network functions, performance, failure handling.

    d. I/O functions, performance, failure handling.

    e. Test of common mode failures (power supplies, network devices)

    f. HMI displays, SOE display, log functions, and performance

g. Process Server functions, performance relating to the RTU control system signals, information and control.

h. • Engineering and Diagnostic Station functions, performance, failure handling and notification.

53. Correct functioning of all hardware and software is demonstrated in terms of the Works Information requirements.

54. The purpose of these tests is to demonstrate that the RTU control system meets the functional and performance requirements and is fit for shipment to Site, but this does not relieve the *Contractor* of his responsibility for the satisfactory functioning and performance of the RTU control system during site acceptance testing (SAT).

55. The proposed test procedures, together with test dates, are prepared by the *Contractor* and submitted to the *Project Manager* for acceptance during the system engineering and design phase.

56. The final test procedures are prepared by the *Contractor* and submitted to the *Project Manager* for acceptance at least 10 working days prior to the scheduled test date. The Contractor shows these dates in the Accepted Programme.

57. FAT is performed by the *Contractor*, on each individual RTU control system and the system (RTU control system, network and the Hitachi MicroSCADA) as a whole to demonstrate the interoperability.

58. The hardware used for the FAT, when successfully completed, is shipped and delivered to the Site for the Site acceptance testing. (SAT).

5.1.7.10 Construction and erection phase

59. This phase involves the following Contractor activities:

a. The installation of the RTU control systems.

b. The integration of the RTU control systems with the remaining systems and field equipment (IDF).

c. The installation of the communications and control networks systems.

d. The erection and installation of equipment inside the panels to accommodate the RTU control system and any infrastructure required to house or contain equipment in the equipment room.

e. After the old equipment/ systems have been removed the physical location (e.g. Equipment rooms) is repaired or returned to an acceptable state and presented to the Project Manager for acceptance.

f. It is acceptable for the RTU control system equipment to be housed temporarily outside its cubicle, provided that it is mounted in the cubicle as soon as that specific part of the existing RTU has been removed.

g. The Contractor is responsible for the provision and storage of all temporary or expendable materials required.

5.1.7.11 Commissioning phase

60. Each individual RTU control system is subjected to this phase. This means that each sub system as well as the system as a whole is subjected to this phase. Commissioning depends on the plant condition as well as production requirements. At all times, the Contractor adjusts his programme by switching systems due for implementation to cater for plant availability. The Contractor confirms the final arrangement with the Project Manager at least 2 working days prior to commissioning, and is shown in the Accepted Programme. In the event of a problem experienced

during the commissioning, of the AGC RTU control system, it is possible to change back to the existing RTU control system and make it operational within 1 hour.

5.1.7.12 Commissioning documentation requirements

61. The *Contractor* prepares test documentation as well as the final commissioning procedures for the RTU controls system. The documents incorporate space for the *Contractor* to enter results of the testing as well as space for both parties to witness that the tests have been conducted according to the mutually agreed test procedures, successfully and meeting the Works Information functional and performance requirements. All the documentation, manuals and drawings for the RTU control systems are put in place, by the *Contractor*, before the relevant test commences. This documentation is submitted to the Project Manager for acceptance at least three (3) weeks prior to commissioning and testing, and is shown in the Accepted Programme.
62. All documentation is incorporated into the commissioning and testing manuals, with full details on testing methods and procedures.
63. The *Contractor* provides notification to the Supervisor two (2) weeks prior to commencement of commissioning and testing and it is shown in the Accepted Programme. The Supervisor inspects all parts during commissioning and is present whenever any of the tests performed by the *Contractor*. Should the Supervisor waive the witnessing of any tests it does not relieve the *Contractor* of any of his responsibilities.
64. Any tests required by the *Supervisor* are carried out during commissioning to prove compliance with the Works Information, irrespective of any tests carried out at the manufacturer's facility during erection and FAT.
65. All test and calibration Equipment is provided and maintained to the required accuracy by the *Contractor*. The accuracy of test and calibration Equipment is proven to the *Supervisor* with valid certificates by an approved authority to be better than ±0,1%. The type and class of Equipment used is subject to acceptance by the *Supervisor*. During any phase of the testing, the *Supervisor* may require that the Equipment be checked by the SABS.
66. The *Contractor* provides a test certificate for each RTU control system down to the individual signal level. The format of this certificate is presented to the Supervisor for acceptance prior to its use by the Contractor.
67. The test results in the form of check sheets following each commissioning and test stage is submitted to the *Project Manager* for acceptance prior to the *Contractor* progressing to the next phase or stage.
68. The *Contractor* supplies all Equipment and resources needed for testing and commissioning.
69. The *Supervisor* co-ordinates the commissioning of all equipment forming an integral part of the RTU control system.
70. In those cases where various components are connected to form an integrated system, the *Contractor* carries the responsibility for the correct functioning and performance of the entire RTU control system.
71. In the event of incorrect functioning of the RTU control system and its subsystems, the *Contractor* investigates the cause and corrects the defects. If the problem is within Equipment, Plant and Materials supplied by the *Contractor*, the *Contractor* corrects the defects before proceeding further with the commissioning.
72. Binary switches are manually operated. Analogue inputs are simulated/activated from the field device level through injection of signals via a Memocal, equivalent or better device. The system as a whole is proven by the Contractor to perform in accordance with the requirements of the Works

Information, for acceptance by the Project Manager. Test certificates are issued for each RTU control system tested and proven.

5.1.7.13 Testing (Acceptance and Operational Testing)

73. All components designed, procured and fabricated, by the *Contractor*, are subjected to acceptance and integration tests. These tests are planned and included in the Accepted Programme and are witnessed by the *Supervisor*.
74. Technical requirements for testing are specified in section 2.4.5, the progress review and scheduling requirements are specified in section 4.

5.1.7.14 Inspection Checklists and Certification of Activities

75. Results of inspections, tests and other activities performed in accordance with the *Contractor's* QC procedures and plans are recorded on standardised checklists and certificates, (refer to GGP 03490 Rev 0, " Procedure for onsite commissioning for low pressure systems", for the format) it also includes any additional checklists.

5.1.7.15. Site Integration Test (SIT) stage

76. The *Contractor* carries out SIT to ensure the correct performance of the RTU control system and its communication networks. Most importantly, the *Contractor* performs the SIT to ensure safety of plant and personnel, and to ensure compliance with the Works Information before commissioning of any plant commences.
77. The proposed test procedures, together with test dates, are prepared by the *Contractor* and submitted to the *Project Manager* for acceptance during the system engineering and design phase.
78. The final test procedures are prepared by the *Contractor* and submitted to the *Project Manager* for acceptance at least 10 working days prior to the scheduled test date. The *Contractor* shows these dates in the Accepted Programme.
79. The *Contractor* provides all the test Equipment for testing the individual modules, the subassemblies for Site Integration Testing and commissioning. Records are kept of each SIT in a log book defining the test to be under taken, time and date of commencement of the test, duration of the test, criteria that need to be met and results obtained of the tests. These records are submitted to the *Project Manager* for acceptance after the Completion of each of the SIT tests. In the event of an error with any test (hardware or software), the fault is notified as a Defect and is analysed by the *Contractor* and the solution reported the *Project Manager*.
80. The *Project Manager* determines if the Defect is of a minor nature, the *Contractor* is given access to rectify the Defect and the item is re-tested for the full duration. Major Defects such as hardware or software failure on the RTU control system terminates the SIT. The *Contractor* rectifies the Defect(s) and re-starts the SIT after proving the corrected Defect by carrying out the appropriate diagnostic tests. Upon Completion of SIT, the RTU control system is deemed available for cold commissioning (functional testing).

5.1.7.16 Cold commissioning stage

81. The functional tests, performed by the *Contractor*, form part of the cold commissioning of the RTU control system and includes the checking of all measurement loops, signal loops, binary controls and analogue monitoring, and alarming up to the Hitachi MicroSCADA.

5.1.7.17 Hot commissioning stage

82. Before equipment is placed in service, the *Contractor* certifies that it is in a suitable and safe condition, subject to acceptance by the *Project Manager.*

83. The *Contractor* performs the commissioning of the entire RTU control system and all tests for signals are done from the IDF (field equipment) to the Hitachi MicroSCADA HMIs Assistance for the *Contractor* may be provided for this activity by representatives from the *Employer's* personnel. The *Contractor* submits a written request to the *Project Manager* for this assistance, five days (5) prior to commencement of hot commissioning and it is shown in the Accepted Programme.

84. The *Contractor* performs the of the RTU control system as a prerequisite for Completion of commissioning and it is shown in the Accepted Programme.

5.1.5.18 Site Acceptance Testing (SAT)

85. The Contractor provides a detailed site acceptance test procedure, which is presented to the Project Manager for acceptance at least 10 working days prior to the commencement of the site acceptance testing and it is shown in the Accepted Programme. The detailed site acceptance test procedure covers all the activities and related documentation of the site acceptance test stage.

86. After Completion of installation and commissioning of the RTU control system, the Contractor demonstrates that the RTU control system correctly performs in the following modes:

    a. Analogue monitoring, and digital control and alarming, logs documented and clarified at the design freeze phase, and tested during the FAT and Hot Commissioning.

    b. All the functions and performance requirements as specified in the Works Information at all the levels of the RTU control system are exercised.

5.1.5.19 Operational testing phase

During the operational test the works is not deemed in use until the *Project Manager* certifies Completion.

5.1.5.20 Safety Requirements

87. The *Contractor* complies with the latest revision of the Eskom Generation Plant Safety Regulations and stipulations of the OHS Act.

88. Safety is of highest priority with site induction, an Eskom approved safety file. Additionally, work will be performed under a Permit to Work supplied by the *Employer,* with additional supervision included.

89. If heavy equipment is to be moved during construction and installation. Rigging shall be done by qualified riggers only.

5.1.5.21 Documentation requirements

90. The *Contractor* provides engineering drawings as per the Vendor Document Submission Schedule (VDSS) attached in Appendix 5.

91. The *Contractor* supplies all documentation in English and three copies in word print and soft copy of the following As Built Drawings:

    a. Final general arrangement drawings.

    b. Final schematic and Wiring drawings.

    c. Final panels wiring drawings.

    d. Operation and maintenance manuals.

92. The *Contractor* supplies al drawings in Eskom Approved template.

5.1.5.22 Drawings

93. The *Contractor* provides a circuit diagram which reflects the system design, identifies components which will include the identification of all components by name, serial number and manufacturer name. The serial number on the circuit diagram is also recorded on a list with the component description by the *Contractor.*

5.1.5.23Technical data

94. The *Contractor* includes the following data in the proposal:

    a. List of spare parts recommended for start-up and normal maintenance purposes

    b. List of the special tools furnished for maintenance

    c. Complete tabulation of utility requirements, e.g. electricity, air, etc

    d. Any start-up, shutdown or operating restrictions required to protect the integrity of the equipment

95. Procurement of components by the *Contractor* shall not proceed without the *Employer*'s review and acceptance of the components selected.

5.1.5.24 Parts Lists and Recommended Spares

96. A comprehensive spares list, as proposed by the OEM's and best maintenance practices, is supplied by the *Contractor*.

97. The *Contractor*, as part of the *Works*, provides one full set of spares. This includes one of each module/card to be kept by the *Employer* in the Arnot Stores. The *Contractor* submits a comprehensive spares list with the tender, which includes all relevant part numbers/identification numbers and specifications. The *Contractor* confirms the final spares list no later than six weeks prior to completion date and submits to the *Employer*'s Representative's for approval. The spares are delivered before the completion of the *Works* so that they are included in final assessment.

98. The *Contractor* submits complete parts lists for all equipment and accessories supplied. These lists includes part names, manufacturer's unique part numbers and materials of construction (identified by applicable International Standards).

99. Interchangeable parts are identified as such by the *Contractor*. The *Contractor* uniquely identifies parts that have been modified from standard dimensions or finish to satisfy specific performance requirements by part number.

100. The *Contractor* identifies standard purchased items by the original manufacturer's name and part number.

101. The *Contractor* indicates on each of these complete parts lists all those parts that are recommended as start-up or maintenance spares, and the recommended stocking quantities of each.

102. The *Contractor* provides datasheets for individual components with all the necessary data.

5.1.5.24Installation, Operation, Maintenance and Technical Data Manuals

103. The *Contractor* provides sufficient written instructions and all necessary drawings to enable the *Employer* to install, operate and maintain all of the equipment covered by the purchase order.

104. The *Contractor* prepares the manual or manuals specifically for the equipment covered by the purchase order.

105. The *Contractor* compiles all information required for the proper installation of the equipment in a manual.

106. The *Contractor* supplies a manual containing all required operating and maintenance instructions after all specified tests have been successfully completed.

107. In addition to covering operation at all specified process conditions, this manual also contains separate sections covering operation under any specified transient condition or condition deemed to be outside of normal operation, including the following as a minimum:

a. Start-up.

b. Normal shutdown.

c. Emergency shutdown.

d. Operating limits.

e. Depressurisation instructions.

f. Describe adjustment procedures.

g. Routine operational procedures.

h. Performance data,

i. As-built data, including datasheets.

108. The *Contractor* compiles and provides the maintenance manuals for all equipment as required by the business unit and maintenance section. These maintenance manuals must include detailed guidelines on how to disassemble the equipment, perform inspections and identify possible wear or deterioration areas, repair failed components or replacements, and reassembly.

109. The *Contractor* also compiles and provides a troubleshooting guide for the new RTUs, indicating possible problems or scenarios along with its causes and solutions.

5.1.6 Maintenance requirements

5.1.7 Maintenance Planning

110. The *Contractor* compiles a full maintenance strategy for all the new RTUs. This includes all electric/electronic components.

111. The *Contractor* configures this system such that maintenance can be performed on various components without having to switch off the RTUs.

112. The *Contractor*'s design of the system also allows this with redundant components.

113. The *Contractor* designs the RTU system such that the maintenance is relatively easy to perform to minimise unavailability of components.

5.1.8 Test and support equipment required

114. The *Contractor* provides any specialised equipment that will be necessary for testing of any components along with the RTU replacement.

5.1.9 Engineering, Maintenance and Operating personnel training requirements

115. The *Contractor* provides basic training on all the RTUs components to all maintenance staff as required by the business unit.

116. The *Contractor* provides advance training to senior technicians on all of the more complex components. The *Contractor* provides adequate training of the *Employer's* maintenance and engineering departmental staff. Training provided to Engineers includes the setup and configuration of the RTU, adding and removing signals through a hard wired interface as well as over the IEC 61850 bus. Training provided to maintenance staff includes the appropriate means to maintain and fault-find the RTUs. Two training sessions are required to be arranged by the *Contractor* on separate occasions. The total number of the *Employer*'s employees to be trained is estimated to be ten people. Applicable training aids and manuals are provided to each trainee. The *Contractor* includes any specialised equipment required for the works and that will aid in

commissioning purposes in the scope of supply. This is handed over to the *Employer* for future use at project completion.

5.1.10 Accessibility

117. The *Contractor* designs and manufactures the system such that the components are located where they are accessible and can safely be adjusted and serviced.

118. The *Contractor* designs the system such that all components are accessible and fitted so as not to interfere with adjustment or maintenance.

119. The *Contractor* gives special attention to the location of the components that need regular maintenance.

5.1.11 Quality requirements

120. The *Contractor* performs the *Works* in accordance with Eskom standards and procedures.

121. No work will be done by the *Contractor* without QCPs (Quality Control Plans) and ITPs (Inspection and Test Plans) that is accepted by the *Employer.*

122. The *Contractor* therefore submits a QCP to the *Employer* for each item installed with adequate time remaining before that part of the work is to be commenced.

123. Each QCP contains a space, separate from the individual interventions points, where the names of the nominated quality representative from each party will print their names and sign next to it; this is to aid signature identification.

124. Intervention points will be signed as the work progresses and no back-dating will be allowed. Notification for interventions to be in writing and to be done at least 24 hours in advance for interventions on site and at least 72 hours in advance for work outside site.

125. The *Contractor*'s QCP's and related documentation to be subject to comment and acceptance by the *Employer*'s quality control personnel.

126. The *Contractor*'s QCP's make provision for signatures for interventions by at least the *Contractor*'s QC representative, the *Employer*'s engineering department and the site AIA representative.

127. The following minimum hold points must be included for the *Employer*'s Quality Control department:

a. Initial acceptance of QCP's.

b. Marking of cut lines.

c. Final inspection.

d. Final data book review.

6. *Employer*'s design

The *Employer*'s provides operating philosophy / user requirement specification (URS) / performance specification to which the *Contractor* is to comply when he is required to design the *works*

6.1. Parts of the *works* which the *Contractor* is to design

The Contractor provides the whole of the works as defined in section of the Works Information except where explicitly stated as otherwise

6.2. Procedure for submission and acceptance of *Contractor*'s design

(1) All design and information change is as per the VDSS in Appendix A.

(2) A transmittal note is kept for all communication whether it is a query, clarification submission or reply.

(3) A transmittal numbering system is developed by the Project Manager and is proposed before Contract Award

(4) The Contractor shall establish a document tracking system to record the dates for the supply and receipt of all design drawings, calculations, requests for information and design documentation.

(5) The Contractor shall supply the following documentation as the minimum requirements of this specification in the design package before any manufacturing, construction or commissioning commences:

a. Document submittal schedule indicating when all documents shall be submitted.
b. Drawing Register indicating when drawings shall be submitted.
c. Complete detailed design file.
d. Functional Specifications.
e. Component material datasheets.
f. Constructability Assessment.
g. Quality Control Procedures.
h. Quality Control Plan and Inspection and Test Plan.
i. Method Statements.
j. Commissioning procedures.
k. Assembly procedures.
l. Technical, Operation and Maintenance Manuals of all plant equipment.
m. Operating Philosophies.
n. Maintenance Philosophy.
o. Maintenance schedules.
p. Instrument/ Signal schedule.
q. Electrical Hook-up diagrams.
r. LOSS diagrams.
s. Electrical termination schedules.
t. Critical Spares List.
u. Operating, Maintenance and Engineering Training Manuals.

(6) The Contractor shall seek acceptance of the detailed designs from the Project Manager. Only drawings and designs accepted by the Project Manager shall be used for construction.

6.2.1. Project Completion Milestone

(1) The Contractor updates the design freeze documentation package with any changes made during commissioning.

(7) The Contractor submits as-built documentation to fulfil the project complete milestone as per Appendix A01 – Vendor Document Submittal Schedule

6.3. Other requirements of the *Contractor*'s design

The contractor designs the plant as per the requirements of configuration management and Document Management
The Contractor designs his system to meet the requirements of the standards and specifications

6.4. Use of *Contractor*'s design

The contractor's design is used for the following:

(1) Design reviews to ascertain that the design of the essential instrumentation complies with the requirements of the works information

(2) Verification that the installed works is in accordance to the approved design

(3) Commissioning

(4) Maintenance and fault-finding

6.5. Design of Equipment

The *Contractor* determines the design required for the Equipment to be utilised to Provide the Works. This design is submitted to the *Project Manager*, for his acceptance

6.6. Equipment required to be included in the *works*

The *Contractor* determines the Equipment required to Provide the Works.

6.7. As-built drawings, operating manuals and maintenance schedules

(1) Three(3) hard copies and two (2) soft copies of As Built documentation is provided by the Contractor as part of the works

(2) Acceptance of the 'As Built' documentation is a pre-requisite for the Sectional Completion of the Plant Area concerned.

(3) The documents are reviewed by the Project Manager for correctness and conformance to the accepted design.

7. Procurement

There is a cross reference from the definition of Disallowed Cost in Options C D and E to the Works Information regarding procurement procedures. This part of the Works Information MUST include any such procedures to be able to administer this procedure. Options A & B may also require constraints on procurement procedures.

7.1. People

7.1.1. Minimum requirements of people employed on the Site

Specify any constraints relating to people employed to Provide the Works; for example permits for foreigners, training (other than H & S), use of labour from designated areas and industrial relations.

7.1.2. 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.

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

If the ASGI-SA requirements are to be included in this contract specify constraints which *Contractor* must comply with after contract award in regard to any ASGI-SA requirements. The ASGI-SA Compliance Schedule completed in the returnable tender schedules is reproduced here. If ASGI-SA does not apply, delete this paragraph.

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

.

[Insert the agreed ASGI-SA Compliance Schedule here]

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

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

7.2. Subcontracting

7.2.1. Preferred subcontractors

ECC does not make use of nominated subcontracting, but the *Employer* may list which subcontractors or suppliers the *Contractor* is required to enter into subcontracts with. This is usually only required where Plant and Materials need to be obtained from a particular supplier or group of suppliers in order to comply with operational standards.

7.2.2. Subcontract documentation, and assessment of subcontract tenders

Specify any constraints on how the *Contractor* is to prepare subcontract documentation, whether use of the NEC system is compulsory or not (compulsory is recommended) and how subcontract tenders are to be issued, received, assessed (using a joint report?) and awarded.

7.2.3. Limitations on subcontracting

The *Employer* may require that the *Contractor* must subcontract certain specialised work, or that the *Contractor* shall not subcontract more than a specified proportion of the whole of the contract.

7.2.4. Attendance on subcontractors

State requirements for attendance on Subcontractors, if any

7.3. Plant and Materials

7.3.1. Quality

Quality requirements relating to Plant and Materials will be developed and identified, by the *Contractor*, and accepted, by the *Project Manager*, as part of the Procurement Specification of the Installation Design – which will include the Bill of Material.

7.3.2. Plant & Materials provided "free issue" by the *Employer*

There are no Plant and Materials provided as "free-issue' by the *Employer*

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

The *Employer* requires warranties from suppliers to be in favour of the *Employer* and not just to the *Contractor*. Where provided warrantees from suppliers exceed the Defects Date, those warrantees are passed on to the *Employer*. All *Contractor's* supplier data which the *Employer* may need after Completion of the whole of the *works* is supplied to the *Employer* at delivery.

7.3.3.1. Procurement: Storage of equipment, Plant and Materials

	Activity description	*Project Manager*	*Contractor*	Requirements	Planning	Additional notes
•	Provision of plans for laydown areas and conservation requirements for storage.		X		Notification 6 months prior to delivery to Site	
•	Arrange storage space and notify *Contractor* of storage available.		X	• *Supervisor* arranges.	Within 6 weeks of receipt of notification	
•	Notify *Project Manager* if storage space not suitable.		X		Within 2 weeks from *Employer's* response	To allow sufficient time for the *Employer* to arrange alternative facility.
•	Provision of suitable Storage Area		X		In accordance with Accepted Programme	
•	Moving of equipment, Plant and Materials and related support services (i.e. rigging) to and from receipt inspection area, storage facility, laydown areas and Site.		X		In accordance with Accepted Programme	
•	Tracking and control of equipment, Plant and Materials.		X		In accordance with Accepted Programme	
•	Conclusion	X	X	• This activity group is complete upon agreement of a suitable storage area.	In accordance with Accepted Programme	Deliverables: • Laydown plans • Allocated storage areas

7.3.4. Spares and consumables

7.3.4.1. Spares

The *Contractor* supplies any spares which may be required for and during commissioning of the *works.* These spares, if unused, are handed over to the *Employer* at Completion.

The *Contractor* provides a recommended list of spares or parts with each unit priced and the relevant support information (e.g. Manufacturer's names, technical data sheet and lead times.

For the recommended list of spares, the *Contractor* provides the basis for spares inventory with specific reference to critical spares.

When applicable, the *Contractor* delivers spares to the Site stores and in liaison with the *Project Manager,* and supplies the data necessary for booking spares into stores

7.4. Tests and inspections before delivery

The *Contractor* complies with all the requirements of the Test and inspections before delivery must form part of the contractor's test procedure submitted to the *Project Manager* for acceptance.

Specific hold and witness points will be assigned by the *Employer* as part of its acceptance review of the manufacturing and testing quality control plans prior to start of any tests and inspections

7.5. Marking Plant and Materials outside the Working Areas

Not Applicable

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

The *Contractor* determines the Equipment required to Provide the Works

7.7. Cataloguing requirements by the *Contractor*

Not Applicable

8. Construction

8.1. Temporary works, Site services & construction constraints

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

All Site access is controlled through the designated access gate.

The *Contracto*r is informed of the access procedures through Site regulations and that such procedures may change depending on the prevailing security situation.

The *Contractor* is to comply with all Site regulations and instructions. The onus is on the *Contractor* to ensure his familiarity with the Employer's Site regulations and inspections.

No person will be issued with an access permit without proof that the person did attend the Arnot Power Station induction course.

A one-day access permit will be issued for persons attending the induction course. It is the *Contractor's* responsibility to arrange with the Project Manager one week in advance for a course booking.

8.1.2. Restrictions to access on Site, roads, walkways and barricades

All vehicles must be driven with due consideration for personnel and property. A maximum speed limit of 40 kilometres per hour will be adhered to on the premises at all times. No personnel at the back of any vehicle.

The Contractor shall provide and install fixed barricades and warning devices to ensure that equipment and persons are not exposed to danger or to prevent access to dangerous areas.

All welding, flame cutting and grinding work shall be properly screened to protect persons from arc flashes or eye injuries.

All grating shall be covered with an adequate protective screening when welding or flame cutting.

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

Restrictions and hours of work may apply on some Sites. It is very important that the *Contractor* keeps records of his people on Site, including those of his Subcontractors which the Project Manager or Supervisor

8.1.4. Health and safety facilities on Site

SHEQ policy is a statement of intent and a commitment by the organisation's CE and senior management in relation to the relevant SHE roles and responsibilities, the achievement of their strategic objectives, values of integrity, customer satisfaction, excellence, and innovation.

Eskom COVID-19 Health and Safety Policy Statement, strive to ensure a COVID-19- free and safe working environment for all. As per the requirement of Section 8 of Occupational Health and Safety Act, and base on a COVID-19 specific risk assessment, Eskom has identified and implemented control measures to prevent the spread of the Coronavirus.

The principal contractor and all appointed contractors, if already not in place, will be required to compile an organisational SHE policy in line with their SHE responsibilities. The policy must be signed by the organisation's CE or the appointed assistant to the CE OHS Act Section 16(2). The policy must be displayed in a prominent place within the workplace. A copy of the policy must be filed in all the contract SHE files and as an annexure of the SHE Plans

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

All equipment and materials necessary for the construction of the Essential Measurement Display system shall be selected to be suitable for the specific environment of where the equipment and materials are installed.

Equipment shall operate and function at the temperatures, humidity, vibration level and exposure to contaminants that prevail at the specific installation environment

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

All equipment and materials necessary for the construction of the Essential Measurement Display system shall be selected to be suitable for the specific environment of where the equipment and materials are installed.

Equipment shall operate and function at the temperatures, humidity, vibration level and exposure to contaminants that prevail at the specific installation environment

8.1.7. Title to materials from demolition and excavation

Not Applicable

8.1.8. Cooperating with and obtaining acceptance of Others

The *Project Manager,* in conjunction with the *Supervisor,* co-ordinates the work of Others on Site. The *Contractor* co-operates with and does not delay, impede or otherwise impair the work of Others

8.1.9. Publicity and progress photographs

Written acceptance from the *Project Manager* is required prior to:

- The issue of photographs, even if included in a report or submission, to a third party,
- Any publication on notice boards, advertising, media relations, and photography and progress photographs.

8.1.10. *Contractor*'s Equipment

All equipment and tools must be listed and specified before they are brought on Site. This list serves as evidence for removal permits upon Completion of the *works*.

Tools, test equipment & consumables

	Activity description	*Project Manager*	*Contractor*	Requirements	Planning	Additional notes
•	Supply of standard tools as well as all specialised tools		X	• Specialised tools are supplied by the *Contractor*. • In the case where specialised tools are to be manufactured specifically for Arnot P/S , the *Employer* will take ownership of the tools after Completion of the *works* on the last unit. • After implementation on the first unit, the *Contractor* makes available the specialised tools for any maintenance that might be required by the *Employer*.	As required	Any additional special tools furnished by the *Contractor,* which cannot be recovered (whether decontaminated or not), will be for the *Contractor's* account.

	Activity description	*Project Manager*	*Contractor*	Requirements	Planning	Additional notes
•	Supply of standard test equipment as well as all specialised test equipment (including specialised calibration tools and equipment).		**X**	• Specialised test equipment is supplied by the *Contractor*. • In the case where specialised test equipment has to be manufactured specifically for Arnot P/S, the *Employer* will take ownership of the tools after Completion of the *works* on the last unit. • After implementation on the first unit, the *Contractor* makes available the specialised test equipment for any testing that might be required by the *Employer*.	As required	Any additional special equipment furnished by the *Contractor,* which cannot be recovered (whether decontaminated or not), will be for the *Contractor's* account.
•	Conclusion	**X**	**X**	• This activity group is complete upon take over.	In accordance with Accepted Programme	Deliverables: • Tools and test equipment that may not be recoverable.

8.1.11. Equipment provided by the *Employer*

The *Employer* does not provide any Equipment for the *works*.

8.1.12. Site services and facilities

Contractor's Yard
A site for the Contractor's yard is provided by the Employer. A written request, indicating the Contractor's requirements in locality and area of storage, office and Work Shop sites is submitted to the Project Manager as soon as possible after the Contract Date.

8.1.13 Potable water

Potable water for construction purposes is also available free of charge. Any installation is for the Contractor's account.

8.1.14 Sanitary Facilities

The *Contractor* to provide his own sanitary facilities or use the existing facilities that the *Employe*r already have on site

8.1.15 Fire Protection

The Contractor is to comply with requirements of Eskom Standard NWS 1494 Revision 4 "Fire prevention and protection of Contractor's premises on Engineering Sites" and of Site Regulations pertaining fire protection. (NWS1494 Revision 4).

Any tampering with the Employer's fire equipment is strictly forbidden. All exit doors, fire escape routes, walkways, stairways and stair landings must be kept free of obstruction, and not to be used for work or storage at any time. Firefighting equipment must remain accessible at all times.

8.1.16 Conditions of Power supply for Erection

In order to comply with the Electrical Installation Regulations under the Occupational Health and Safety Act, no 85 of 1993 the following requirements are met before electricity is supplied it is expected that the Contractor is in possession of a valid certificate of compliance. Your electrical installation is inspected and tested by an accredited person to ensure that it complies with the requirements of the Occupational Health

and Safety Act, 1993 and the code of Practice for wiring of premises, SABS 0142. After you have obtained the certificate of compliance, the Employer is to inspect your electrical installation and if satisfied, it is connected and supplied from the construction power supply.

The Contractor provides at his own expense all temporary wiring and cabling to lead power from the Employer's supply points, to where it is required, maintain same and remove on completion.

These points of supply are the points designated by the Project Manager

8.1.17 Facilities provided by the *Contractor*

The *Contractor* provides facilities within his own yard, office, storeroom, canteen, etc. *Contractor* connects electricity to points supplied by the *Employer.*

The *Contractor* provides all remaining facilities to Provide the Works. Facilities provided by the *Contractor* are removed prior to Completion.

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

The *Contractor* is required to take the following special precautions whilst executing the *works*:

- Barricades between the work area and the remainder of the plant (if used) are kept in place and are respected at all times by the *Contractor's* staff.
- All existing services in the area of the *works* will be operational during the period of the contract and at no time will the *Contractor* be permitted to move or disturb these services. It is a requirement of the contract that the *Contractor* perform the *works* within the constraints of these services.
- The *Contractor* ensures that all plant and associated systems are protected from sustaining damage, of any form whatsoever, during the *works*.
- The *Contractor* ensures that all existing services such as cables; instrumentation; cable trays; fire barriers and pipe work that may be damaged during installation have been identified and where possible relocated away from possible harm. However, due to the limited space available such relocation of services may be impractical and could still result in restricted working space available to the *Contractor*.

8.1.19 Survey control and setting out of the *works*

The *Contractor* participates in the mandatory Site visit to view the Site and associated constraints. The *Contractor* provides its requirements for any related survey control and setting out of the *works* in the *Contractor's* Works Information – submitted as part of the tender.

Further details may be developed as part of the Work Plan as stated in this Works Information

8.1.20.Excavations and associated water control

Not Applicable

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

Not Applicable

8.1.22.Control of noise, dust, water and waste

The *Contractor* will ensure that the dust levels are kept to a minimum. Water supply will be provided by the *Employer*. The *Contractor* will identify where water supply is needed and give the *Employer,* thirty (30) days' notices prior to start of *works*.

8.1.23 Sequences of construction or installation

Sequencing of construction activities on site are established, by the *Contractor* as part of the Work Plan development and submitted to the *Project Manager*, with the Work Plan.

8.1.24Giving notice of work to be covered up

The *Contractor* gives 24-hour notice, prior to work being covered up, of any inspections the *Supervisor* needs to perform on Site. Should the *Contractor* require inspections off Site, the *Contractor* allows for enough time to enable the *Supervisor* to make travel arrangements, following the *Contractor's* notification.

8.1.25 Hook ups to existing works

Where hook-ups to existing *works* are required, the impact and effect of such hook-ups are detailed in the Installation Design and specific requirements identified in the Work Plan.

8.2. Completion, testing, commissioning and correction of Defects

8.2.1.Work to be done by the Completion Date

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

8.2.2.Use of the *works* before Completion has been certified

The *Employer* and Others may use the *works* for the performance of acceptance tests, and commissioning as well as production.

8.2.3.Materials facilities and samples for tests and inspections

The *Contractor* only provides that which is accepted as part of the test procedure compiled.

The *Contractor* complies with all the requirements of the Test and inspections before completion must form part of the *Contractor's* test procedure submitted to the *Project Manager* for acceptance

8.2.4.Commissioning

Commissioning will take place after installation and before Sectional Completion handover. Commissioning tests to be performed are detailed. All testing and commissioning requirements is stated in the Installation Design and procedures are to be developed and submitted to *Project Manager's*.

During the commissioning period, the *System Engineer* must be present to confirm operability of the system and the sign-off of various Witness Points and Hold Points on the *Quality Control Plan* by the *Project Management Quality Control* and *System Engineering.*

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

The *Contractor* complies with all the requirements as stipulated in the TRS 240-105180371 and this will only be verified during the installation design.

8.2.6. Take over procedures

The *Employer* will use the *works* during start-up of each unit up to and including the point where any related testing and commissioning that requires the plant to be in operation have been successfully completed.

The *Employer* is not willing to take over the *works* until all related testing and commissioning have been completed, all as built documentation updated by the *Contractor*, all implementation records completed by the *Contractor*, accepted by the *Project Manager* and all related configuration updates completed by the *Contractor*.

8.2.7. Access given by the *Employer* for correction of Defects

Upon the *Supervisor's* notification of Defect following unit start-up, the *Supervisor* shall identify the period wherein access will be given to the *Contractor* for access to correct Defects. Ordinarily, access will only be given during a planned shutdown of the applicable Arnot Powerstation

8.2.8. Performance tests after Completion

The *Contractor* complies with all the requirements of the TRS 240-105180371 and this performance test of the power supplies will be supplied during the installation design.

8.2.9. Training and technology transfer

The preferred venue for any training course is the job-site where the equipment will be installed. If due to any reason this is not possible, then the vendor shall state at what location the course would be held.

Two levels of training are required:

The Basic Level:

This course shall be orientated towards maintenance personnel and shall give a full understanding of the system operation, fault-finding

Procedures and basic changes to the system that can be made.

The Advanced Level:

This course shall be orientated toward personnel responsible for all system changes and shall include items over and above those covered in the basic course.

8.2.10. Operational maintenance after Completion

Operational maintenance will be performed by the *Employer* in accordance with the maintenance requirements specified by the *Contractor*.

9. Plant and Materials standards and workmanship

Poor quality of workmanship will not be tolerated by the *Employer*. *Contractor* staff, including subcontractor staff performing construction work on Site will be subject to skills assessment tests in accordance with the requirements stated.

9.1. Investigation, survey and Site clearance

The *Contractor* is allowed access, by the *Employer*, to the Site to further inspect the Working Area on Site. Any *works* that may be required to survey the plant area, will be subjected to standard planning and scheduling requirements of plant work i.e work plan with associated risk assessment and planning and scheduling

9.2. Building works

Building *works* are not applicable in this contract.

9.3. Civil engineering and structural works

Civil engineering and structural *works* are not applicable in this contract. *Contractor* to inform the *Employer* in case civil *works* are required.

9.4. Electrical & mechanical engineering works

The *Contractor* complies with all the requirements of the works information

9.5. Process control and IT works

The *Contractor* complies with all the requirements of the works information

10. List of drawings

10.1. Drawings issued by the *Employer*

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

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

Drawing number	Revision	Title

C3.2 *CONTRACTOR*'S WORKS INFORMATION

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

Typical sub headings could be

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

PART 4: SITE INFORMATION

Document reference	Title	No of pages
	This cover page	1
C4	Site Information	2
	Total number of pages	3

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

The location of Arnot Power Station is approximately 50 km east of Middelburg in Mpumalanga. Arnot Power Station consists of 6 x 350MW turbo generator units with an installed capacity of 2100MW at maximum continuous rating (MCR)

Access limitations

The *Contractor* takes note that he will be performing construction work on a national key point (Arnot Power Station) fence. The *Contractor* will be responsible for ensuring that no unauthorised person gains accesses the fence area during construction. The *Contractor* provides all relevant security personnel during construction.

The *Contractor* provides a temporary fence to separate the construction site from the normal operation of the coal stockyard. The *Contractor* further provides all the necessary personnel and strategies to effectively manage traffic in and out of his site without interrupting the normal operations of the coal stockyard. The *Contractor* ensures that all vehicles traveling within the coal stockyard are fitted with all the required safety articles such as flags, lights, reverse alarm etc.

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

The *Contractor* takes note that he will be performing construction work on a national key point (Arnot Power Station) fence. The *Contractor* will be responsible for ensuring that no unauthorised person gains accesses the fence area during construction. The Contractor provides all relevant security personnel during construction

3. Subsoil information

N/A

4. Hidden services

N/A

5. Other reports and publicly available information

Title	Number	Revision
Eskom Vehicle Policy		
Occupational Health and Safety Requirements to be met by Contractors and subcontractors employed by Eskom	SCSPVABF3	2

Title	Number	Revision
Eskom Occupational Health and Safety Policy	ESKPBABNO	0
Eskom Procedure on Vehicle and Driver Safety Management	32-93	2
SHE Policy	32-94	0
Eskom Procedure on Effective Management of Safety, Health and Environmental related incidents	32-95	1
Eskom Procedure on Vehicle Safety Specifications	32-345	0
SHE tender requirement	32-726	0
Eskom Environmental Management Policy	ESKPBAAD6	7
Fire protection and protection of contractor's and Eskom premises on engineering sites	NWS 1494	4
Occupational Health and Safety Act 85 of 1993	85 of 1993	
General Environmental Specification		2004