PART 3: SCOPE OF WORK

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C3.1: EMPLOYER'S WORKS INFORMATION

Contents

Description of the *works*

1. Executive overview

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

The *Employer's* objective is to contract with a successful tenderer to complete the *works* for the project. The purpose of the *works* is to provide a new Substation Automation System (SAS) at Kendal Power Station for the MV boards, mitigating the risks experienced with the current system, by increasing the reliability, maintainability, and availability of the system.

1.3 Interpretation and terminology

The following abbreviations are used in this Works Information:

Abbreviation	Meaning given to the abbreviation
AFC	Approved for construction
OBL	Outside battery limits
DSP	Digital Signal Processing
ERTU	Enhanced Remote Terminal Unit or Data Concentrator
FAT	Factory Acceptance Test/Testing
FOC	Fibre-optic Cable
GPS	Global Positioning System
HMI	Human–Machine Interface
I/O	Input/Output
IEC	International Electrotechnical Commission
IED	Intelligent Electronic Device
IP	Internet Protocol
ISO	International Standards Organization
RF	Radio Frequency
RTU	Remote Terminal Unit
SAT	Site Acceptance Test
SCADA	Supervisory Control and Data Acquisition
SCS	Substation Control System
SOE	Sequence of Events
A/D	Analogue to Digital
AC	Alternating Current
Bit/s	Bits per second

SAS	Substation Automation System
EOD	Electrical Operating Desk
PLC	Programmable Logic Controllers

2 Management and start up.

2.1 Management meetings

Meetings will be held between the *Project Manager* and the *Contractor* (and any other co-opted members). The Contractor is represented at each meeting by appropriate members of t its staff.

The venue for the meeting is as determined by the *Project Manager*. The Project Manager writes the minutes of the meetings

The *Contracto*r reports the overall progress and as a minimum requirement, amongst other things on the agenda, the following will also be discussed:

- *Contractor's* current activity progress and planned finish dates.
- *Contractor* to report on all items listed in the NEC core clause, 31
- *Contractor* and *Project Manager's* programme agenda compared for problematic differences.
- Current and projected manpower by class.
- Health, safety and quality Management.
- Progress of other relevant activities.
- To discuss any technical and commercial issues.
- Problem areas or concerns.

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

Title and purpose	Approximate time & interval	Location	Attendance by:
Risk register	Bi-Weekly	Location to be determined by the *Project Manager*	*Project Manager* and *Contractor* (additional resources maybe invited as agreed by the Contractor and Project Manager
compensation events	As and when required	Location to be determined by the *Project Manager*	*Project Manager* and *Contractor* (additional resources maybe invited as agreed by the Contractor and Project Manager
Overall contract progress and feedback	Weekly	Location to be determined by the *Project Manager*	*Project Manager* and *Contractor* (additional resources maybe invited as agreed by

			the Contractor and Project Manager
Payment Assessments Meeting	Monthly	Location to be determined by the *Project Manager*	*Project Manager* and *Contractor* (additional resources maybe invited as agreed by the Contractor and Project Manager

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.

All meetings held on virtual platforms shall always be recorded.

2.2 Documentation control

The documentation requirements cover the various engineering stages, from the design stage through fabrication, installation testing and commission and lastly the operating, maintenance and training stage of the project.

The *Contractor* is responsible for the compilation and the supply of the documentation during the various project stages and to provide the documentation programme to link with the milestone dates. Documentation and drawings are programmed for delivery to meet the milestone dates and in accordance with the agreed VDSS supplied by Employer.

All documents and records must be managed according to Technical Document and Record Management Work instruction (240-76992014), Reporting and Data Requirements Specification for Contractors (240-83561037) and all other Engineering standards referenced in this Work Information. The Employer ensures that the *Contractor* is provided with latest revisions of the standards. Any uncertainty regarding all specified documentation should be clarified with the *Project Manager* and clarification updates should be reflected in clarification meeting minutes. The Language of all documentation shall be English.

2.2.1 Document Identification

a) The *Contractor* is required to submit a Vendor Documentation Submission Schedule (VDSS) in line with what was submitted by the Employer as per agreed dates to the *Project Manager.* The *Contractor's* VDSS shall indicate the format of documents to be submitted. Once the VDSS has been verified and agreed between the *Contactor* and the *Project Manager*, the Project Manager will pre-allocate document numbers as per the VDSS and send back to the Contractor.

b) The VDSS is revisable, and changes must be discussed and agreed between the *Contracto*r and the *Project Manager*. Changes in the VDSS can be additional documentation to be submitted, changes in submission dates or corrections in documentation descriptions, document numbers etc.

2.2.2 Document Submissions

a) All Project documents are submitted to the *Project Manager* with a transmittal note according to Project/Plant Specific Technical Documents and Record Management work Instruction (240-76992014). In order to portray a consistent image, it is important that all document used within the project follow the same standard of layout, style and formatting as described in the Work Instruction.

b) The *Contractor* is required to submit documents as electronic and hard copies and both copies are delivered to the *Project Manager* with a transmittal note.

c) In addition, the *Contractor* adheres to the following standards

- Project Plant Specific Technical Documents – Handover Works Instruction 240-124341168
- Project Documentation Deliverable Requirement Specification 240-65459834
- Technical Documentation Classification and Designation Standard 240-54179170

d) All documentation submitted by the *Contractor*, is accompanied by the completed transmittal with the following field as a minimum.

- Name of the Package
- Name of *Contractor*
- Transmittal Number
- Contractor Details
- Date of Submission
- Description of Document
- Document Number
- Document revision
- Document type
- Document media type
- Number of copies
- Purpose of submission
- Document PBS (e.g., AKZ / KKS)
- Signed by and date

2.2.3 Project Communications

a) All Project Communication shall be submitted to the Project Manager and copy the mailbox that will be supplied to the *Contractor* by the *Project Manager* for tracking purposes.
b) Communication/execution log of all communication to and from the *Contractor* shall be kept to date by both Parties. A communication matrix shall be used to define what information will be disseminated to whom and in which medium.
c) Should there be any change in the people listed in the communication matrix, a revised communication matrix must be sent by either party to ensure that information flows effectively.

2.2.4 Email and Other Submission Method

a) Where applicable and contractually agreed, e-mails submissions can be used, as well as other submission methods employed in the relevant project.

2.2.5 Intellectual Property

a) All designs, drawings, specification, instructions, manuals and other documents created, produced by or on behalf of the Contractor for the purposes of carrying out the works (Collectively, the 'Contractor's Copyright Documents') and copyright therein and all intellectual property rights relating thereto, are, will be, and will remain the property of the *Contractor* for the duration of the project or contract.
b) The *Contractor* hereby grants to the Employer an irrevocable, royalty free, non-exclusive and perpetual licence to use those *Contractor's* copyright documents supplied to the Employer under the Contract for the purpose of operating, maintaining, adjusting, and repairing the works.

2.2.6 Sole Remedies

a) The Parties rights and remedies, as identified in the Contract, shall be the sole and exclusive rights and remedies available to the Parties, in respect of matters to which they are said to relate in the Contract.

2.2.7 Engineering Change Management

a) All Design change management shall be performed in accordance to the latest revision of the Eskom Project Engineering Change Management Procedure (240-53114026). All design reviews will be conducted according to the Design Review Procedure (240-53113685).

2.2.8 Drawing Format and Layout

a) The creation, issuing and control of all Engineering Drawings will be in accordance with the latest revision of the Engineering drawing Standard (240-86973501). Drawings issued to the Employer will be a minimum of one hardcopy and an electronic copy that is editable.

b) All contactors are required to submit electronic drawings in Micro Station (DGN) format, and scanned drawing in pdf format. No drawings in TIFF, AutoCAD or any other electronic format will be accepted.

c) Drawings should be natively drawn in MicroStation V8 as no conversions will be accepted.

d) Drawings issued to the Employer may not be 'right Protected" or encrypted. The employer reserves the right to use these drawing to meet other contractual obligations. The *Contractor* shall include the Employer's drawing numbers in the drawing title block. Drawing numbers will be assigned by the Employer as drawing are developed.

e) All drawings shall be submitted to the Employer for quality check before hand-over. It is recommended that the *Contractor* send a sample drawing for each drawing type to the drawing office as soon as the first drawings are generated, to ensure the correct standard is followed before creating all drawings.

2.2.9 Vender Document Submittal Schedule

a) Appendix 1 – Vendor Document Submittal Schedule specifies the following:

- The type of documentation which is provided.
- The native/original format in which the soft copy of the documentation is provided in addition to the .pdf soft copy.
- The limits of supply of the documentation (clarifying the provider and maintainer of the documentation).
- The stage in the project execution during which the documentation is provided as a deliverable.
- Live documents that are generated and maintained by the engineering tools.

b) Appendix 1 – Vendor Document Submittal Schedule defines the type of technical documents that are exchanged during the project execution only. It is not a document index that lists each and every document technical document.

c) Hardcopies, .pdf soft copies and native/original soft copies of each document specified in Appendix 1 are provided at the stages defined in Appendix 1 – Vendor Document Submittal Schedule.

d) All documentation submitted by the *Contractor* conforms to all the requirements of the technical documentation index and are in an adequate state of completeness.

2.3 Health and safety risk management

2.3.1 General

a) In carrying out its obligations to the Employer in terms of this contract, which obligations include, amongst others, providing the works; using Plant, Materials and Equipment; and whilst at the site for any reason, the *Contractor* is the "Employer" in terms of the Occupational Health and Safety Act, No. 85 of 1993, in respect of its activities and in relation to its employees, agents, and mandatories.

b) The *Contracto*r does not consider itself under the supervision or management of the Employer with regard to compliance with the Safety Health and Environmental requirements.

c) Furthermore, the *Contractor* does not consider himself to be a subordinate or under the supervision of the *Project Manager* in respect of these matters. The *Contractor* is responsible for the supervision of its employees, agents, and mandatories and takes full responsibility and accountability for ensuring that they are competent, aware of the Safety Health and Environmental requirements, whilst executing the works in accordance with the Safety Health and Environmental requirements.

d) The *Contractor* ensures compliance with, amongst others:

- The provisions of the Occupational Health and Safety Act, No. 85 of 1993 and all applicable regulations (as amended), binding in terms thereof;

- The latest versions of standards, procedures, specifications, rules, systems of work and requirements of the Employer, copies of which will be provided to the *Contractor* on request.

- The *Contractor* shall prepare an environmental management plan and method statements relating to the activities that will be carried out.

- The provisions of the National Environmental Management Act (as amended) and all regulations in force from time to time in terms of that Act.

- The *Contractor* implements a comprehensive health, safety and environmental management system, based on the OHSAS 18001 and ISO 14001 requirements for utilisation at the project.

- The *Contractor* appoints a person, qualified and competent in accordance with the safety health and environmental requirements, as the liaison with the Employer's Project Safety, Health and Environmental Manager or delegated person for all such matters as pertaining related to safety, health and the environment. The *Contractor* shall ensure that such a person is contactable 24 hours a day and is registered with a registered professional council approved by the Principal Director of the Department of Labour, as per the requirements of the latest Construction Regulations, inclusive of all exemptions and amendments pertaining thereto.

- The *Contractor* hereby indemnifies the Employer and holds the *Employer* harmless in respect of any and all loss, costs, claims, demands, liabilities, damage, penalties or expenses that may be made against the *Employer* and/or suffered or incurred by the *Employer* (as the case may be) as

a result of, any failure of the *Contracto*r, its employees, agents, and mandatories to comply with their obligations, and/or the failure of the *Employer* to procure the compliance by the *Contractor*, its employees, agents, and/or mandatories with their responsibilities and/or obligations in terms of or arising from the Occupational Health and Safety Act, No. 85 of 1993.

2.3.2 Mandatory Agreements

a) In terms of sections 37(1) and 37(2) of the OHSA, the *Employer* is relieved of any and all of its responsibilities and liabilities pertaining to the activities performed by the *Contractor* (and its employees, agents, Subcontractors and mandatories) relating to the *Works*; the use of plant, materials and equipment; and whilst at the Site for whatsoever reason.

b) The *Contractor* confirms that, in terms of the Construction Regulations, regulation 6, it is hereby mandated as the designer and must perform all duties required of a designer.

c) The *Contractor* confirms that he has been provided with sufficient information regarding the health, safety and environmental arrangements applicable to the works; the use of Plant, Materials and Equipment, as well as at the Site.

d) The Contractor confirms that he will always comply with the Eskom Life Saving Rules which are:

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: Ensure that you have a Permit to Work

The Contractor Further confirms that;

a) Prior to the *Contractor* commencing with any operations/ activities relating to the *Works* and/or prior to gaining access to the Site, the *Contractor* concludes a written mandatory agreement with the Employer in terms of section 37(2) of the OHSA and 5(1)(k) under the construction regulations. The aforementioned agreement constitutes a record of the written arrangements and procedures between the *Contractor* and *Employer* regarding health and safety.

b) As far as is reasonably practicable, the safety and absence of risks to health in connection with the production, processing, use, handling, storage or transport of articles or substances is maintained;

c) As far as is reasonably practicable, all hazards pertaining to the health and safety of persons and harm to the environment that are attached to any work which is performed, any article or substance which is produced, processed, used, handled, stored or transported and any plant or machinery which is used in its business, is clearly identified and, as far as is reasonably practicable, further establishes what precautionary measures should be taken with respect to such work, article,

substance, plant or machinery in order to protect the health and safety of persons and or harm to the environment, and provides the necessary means to apply such precautionary measures;

Such information, instructions, training and supervision as may be necessary to ensure, as far as is reasonably practicable, the health and safety at work of its employees, agents, and mandatories is provided;

d) As far as is reasonably practicable, no employee, agent, and mandatory perform any work or produces, processes, uses, handles, stores or transports any article or substance or operates any plant or machinery, unless the precautionary measures contemplated above, or any other precautionary measures which may be prescribed have been taken;

Such measures as may be necessary in the interest of health and safety and the environment are enforced;

e) Work is performed and that plant, materials or equipment is used under the direct supervision of a person trained to understand the hazards associated with it and who has the authority to ensure that precautionary measures required by the Employer are implemented; and

All employees are informed of the scope of their authority as contemplated in OHSA.

2.3.3 Permit to Work

a) The *Contractor* allocates staff to be trained and authorised as Responsible Persons according to the Employers' Plant Safety Regulations (36-681) and /or High Voltage Regulations (ORHVS). These Responsible Persons must be available on Site as and when required to take out permits to work.

b) In this contract the *Contracto*r shall appoint employees to attend and be authorised as follows;

- Two Supervisors to be Authorised in terms of the PSR as Responsible Person, and
- Two to be Authorised in terms of ORHVS as Responsible Person.

2.4 Environmental constraints and management

Kendal Power Station is ISO 14001 compliant. The Contractor must comply with the requirements of this procedure titled: Environmental Management System Requirement for the Contractors number PG/240/008. Kendal also has an SHEQ Policy PS/270/0083, to which every Contractor and employees must adhere. It is therefore the responsibility of the Contractor to ensure that the Contractor obtains copies of Kendal SHEQ Policy. The Contractor must identify all Environmental aspects and impacts related to his/her activities. The Contractor must have copy of the legal register related to the scope.
Kendal procedures applicable to the Contractor's area of responsibility to assist the Contractor and his/her employees to prevent pollution and comply with legislative requirements, and to familiarize themselves on such procedures, within 30 days from the date of commencement of work at Kendal. Copies of the above-mentioned documents shall be obtained from the Eskom Agent and/or Environmental Officer on the first day prior to commencement of work at Kendal.

The Contractor shall submit a proof to the Environmental Officer of Kendal that he and his employees has done all the necessary training on procedures and Policies supplied to them and that they do understand the contents of the procedures, registers and policies and will adhere to them at all times.
The non-adherence to the rules will result in a non-conformance, hence immediate termination of the contract. Rules are as following:

a) Provide sufficient storage containers, labelled depicting general or hazardous waste and store in a designated storage area.

b) Ensure that all hazardous waste is disposed of at a licensed site. A copy of the hazardous waste disposal certificate must be submitted to the Employer Representative.

c) Ensure that all other general waste is disposed of at the licensed landfill site.

Ensure that your site does comply with the general good housekeeping practices

The contractor/Maintenance must comply with the following requirements.

a) Environmental Management System (ISO 14001:2015)

b) National Environmental Management Act (Act 107 of 1998)

c) Environmental Management Procedure for Contractors (*1018332)

d) Waste Management Procedure (*1024102)

e) Non-conformance, Corrective and Preventative Action (*1017357)

2.4.1 The Contractor is responsible to keep the work area clean of any rubble.
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 latest National Environmental acts and regulations. The removal of any waste and hazardous waste is the responsibility of the Contractor.

2.5 Quality assurance requirements

The Contractor submits a quality control plans prior to commencing work. The quality control plans should cover inspections and test proposals for items or activities to be supplied in the contract. The quality control plan indicates the following:

a) The identification of the activity/operation
b) A list of sequence of operations including inspections and tests
c) The identification of the specification, drawing or procedure for each operation
d) The acceptance criteria with reference to the appropriate technical specification set out by the Contractor
e) The inspections and test the Contractor has nominated for hold and witness points
f) Provision for inspections and tests nominated by the Employer, and /or his representative
g) Inspection and test records which are generated by the Contractor

The *Contractor* is also responsible for the following:

a) The Contractor notifies the Employer of any changes to the quality system and obtains agreement prior to the implementation on the existing orders and contracts or sub orders and contracts.
b) Identifies any additional documents which are to be submitted to the Employer
c) Indicates the interface with the Contractor's quality system and applicable documents such as procedures and work instructions
d) In case a Sub-Contractor is employed, the Contractor indicates how they will be monitored.

The Contractor and/or Sub-Contractors give access to the Employer or his representative where appropriate to their premises and facilities at reasonable times to conduct quality assessments, audits, surveillances, and inspections to establish compliance with the contractual requirements

2.6 Programming constraints

a) All planning and scheduling is done based on the Critical Path Method (CPM). The *Contractor* uses activity codes to define interfaces to be agreed upon between Project Manager and *Contractor.* The Contractor's programme shows the actual critical path clearly.

b) The schedule layout considers the approved WBS, reflecting the manner the *Works* are to be performed as per the Contractor's Method Statement and how activities are to be summarised, reported and monitored.

c) The project programme is prepared representing the significant work activities and deliverables associated with the works.

- The programme includes:
- Major milestones, interface dates, access dates and key dates (for the new plant, existing plant and between Subcontractors)
- The duration of major activities and their relationship to one another.
- Identified long-lead material items.
- Responsibility assignments for accomplishing project objectives end product is a time scaled bar-chart programme developed using logic network.

d) The Contractor's Program will be done using Microsoft Project software.

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

a) The *Contractor* will provide the *Project Manager* with an organogram with the key people and the roles and responsibility. Organogram is to be submitted at Tender stage and will be subjected to approval by the *Project Manager.*

b) The organogram provided must show clear reporting lines between individuals.
c) At minimum, the following people should form part of the organogram:

a) Workshop Manager
b) Site Manager
c) Site Supervisor
d) SHE Rep
e) ECSA registered Electrical Engineer
f) Two Electrical Technicians
g) Project Planner

2.8 Invoicing and payment

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

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

The *Contractor* shall address the tax invoice to Eskom Holdings SOC Ltd and include on each invoice the following information:

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

2.9 Insurance provided by the *Employer*

There are no additional requirements to the risk and insurance clause in Section of 8 of the core clauses.

2.10 Contract change management

In addition to the NEC 3 ECC core clause 6, Compensation events are presented to an internal committee for further verification and approval.

2.11 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.

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

There are no additional requirements to the compensation event clauses in Section 6 of the Core clauses.

2.13 Training workshops and technology transfer

2.13.1 General Requirements

a) The Contractor provides training on the equipment and systems included as part of the works to the various categories of the Employer's technical staff for the duration of the works.

b) All training provided by the Contractor is customised for Kendal Power Station and is directly applicable to the actual equipment and software supplied for the works.

c) Training content encompasses both generalised training based on the Contractor's generic control system architecture, SCADA and design philosophies, and specific training on the architecture, configuration, layout, equipment, software, SCADA hardware and design that the Contractor provides for the works.

d) The training is structured and presented in a manner that the Employer's engineering, Operating and maintenance teams are made fully conversant with all aspects of the Contractor's technology and systems, relevant to their functions.

e) Training facilities are provided by the Contractor.

f) The training facilities provided are:

- Air-conditioned and suitably sized.
- Accommodates all trainees comfortably.
- Includes all engineering tools and workstations.
- Training material and tools are not shared by trainees during the training.
- The training is provided as per the detailed training programme and prospectus accepted by the Project Manager.
- The training schedule for the Kendal specific engineering training, basic maintenance training and operator training is completed at least 1 month before the first changeover.
- The training schedule is incorporated in the Accepted Programme.

2.13.2 Training Categories

a) Practical hands-on training for each individual trainee forms an integral part of each of the courses in these categories:

- Training of maintenance staff (Two sessions)
- Training of operators (Two Sessions).
- Training of engineering staff (Two Sessions)

3 Engineering and the *Contractor*'s design

3.1 *Employer*'s design

The *Employer* provides the requirements of the EOD SCADA replacement and clearly define the battery limits of the EOD SCADA replacement project design and upgrades.

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

The *Employer* completed engineering studies and philosophies, to aid in the identification of scope associated with this project.

The *Contractor* develops the *Employer's* design into a detailed design for all works, to replace the S5 PLC and EOD SCADA for MV Boards at Kendal Power Station.

All drawings from the *Employer's* engineering studies for the *works* are provided for information purposes only. The *Contractor* is responsible and accountable to validate correctness and completeness of the drawings for detail design purposes. The drawing must be natively drawn on MicroStation Version 8 software, not on AutoCAD. Drawing won't be accepted by the Employer if the drawn on AutoCAD and converted to MicroStation Version 8.

The *Contractor* adheres to 36-681: Generation Plant Safety Regulations for all works.

The *Contractor's* scope of work includes design, procurement or manufacturing, integration, assembly, factory acceptance testing (FAT), transportation, off-loading, erection into position, installation, site acceptance testing (SAT), commissioning, certification and handover the following works, to replace the S5 PLCs for the MV Boards, by namely:

- Design a new SAS for MV Boards, HV yard, Transformers and other systems by considering all the logic requirements explained in the *Employer's* design requirements above and the existing S5 PLCs and SCADA operating philosophies.
- Design new enclosure panels to house the new SAS and its auxiliary equipment, to be located at the same location of the existing S5 PLCs, within Kendal's switchgear rooms. The design of the enclosure panels takes into consideration the site conditions of the switchgear room.
- Develop, test and demonstrate the logics for the detail design of the new SAS, to be accepted by the *Employer's* representatives, prior any manufacturing or integration into new enclosure panels.
- On the design of the new panels, transducers must be included for voltage and current signals of each medium voltage panel and the complete switchgear.
- During the design, sampling rate of 256 samples in one cycle must be considered.
- Disconnect the existing hard-wired interfaces from the switchgear to S5 PLC, Fibre from S5 PLC to network switch or other S5 PLC and mark them, during an opportunity that will be given by the *Employer*, defined by the *Project Manager,* for the respective switchgear room.
- Lay new Fibre for interfacing or ring main between new EOD SCADA, Unit MV Boards, HV yard, Common Plant Switchgears, Coal and Ash Plant MV boards. The *Contractor* is to be responsible for the supplying, laying, installation, termination and testing of the fibre continuity, as per standard.

- Disconnect and remove the existing hardware components and enclosure panels, of the old S5 PLCs to a predetermined location assigned by the *Project Manager*.
- Install the new SAS, enclosed in new panels, for the MV Boards. Panels to be supplied and erected according to *standard 240-56355815 Field Instrument Installation Standard: Junction Boxes and Cable Termination.* The Panels to be coloured in light grey (G29) in accordance to the SANS 1091 National Colours Standard. All panels must be IP55.
- Connect all interfaces and hard wiring required for the integration of the new SAS to the respective MV Boards, during an opportunity given by the Employer, defined by the *Project Engineer,* for the respective Switchgear room.
- Connect all required power supplies to the new SAS as prescribed in this document with reference to *standard 240-56227516 LV Switchgear and Control Gear Assemblies and Associated Equipment for Voltage up to and including 1000V and 1500V Standard*. The power supply source(s) are to be obtained from the *Project Engineer,* during the Detail Design.
- Provide detail design drawings according to Eskom Standard for the new SAS, its interfaces and all auxiliary systems.

During design, medium voltage interlock philosophy must be considered and will be proven during FAT and commissioning.

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

3.3.1 Process for Submission of Document

a) The *Contractor* submits all documents according to the accepted VDSS.

b) The process for the submission of documents is described below

- The *Contractor* submits the documents/drawings to the *Project Manager.*
- The *Project Manager's* documents controller registers the documents
- The *Project Manager's* documents controller will supply the documents/drawings to all relevant parties within the *Project manager's* project team.
- The *Project Manager's* team reviews the documents/drawings and will submit all comments or inputs to the *Project Manager* and the *Project Manager* submits to the *Contractor* for consideration.
- If the *Project Manager* finds major deficiencies in the submitted document/drawings, the *Contractor* revises the documents/drawings and resubmits to the *Project Manager*.
- The *project Manager* reviews the documents/drawings and if no major deficiencies are found, the *Contractor* organises a second Design Review session.
- The *Project Manager* and the *Contractor* conduct a Design Review.
- If any fundamental errors were found in the designs or further actions are required, the *Contractor* records all concerns raised and revises the designs.
- The *Contractor* organises a Design Review session once all designs were revised according to the concerns raised by the *Project Manager.*
- If no fundamental errors were found in the designs during the Design Review session, the *Contractor* compiles the Design Review minutes or report and submit it to the *Project Manager.*
- The *Project Manager's* Document Controller registers the report.

- The *Project Manager's* team reviews the *Contractor's* report/minutes. If the report/minutes are not acceptable, the *Contracto*r revises the report/minutes and resubmits to the *Project Manager.*
- The *Project Manager* will accept the *Contractor's* design once the report/minutes are accepted by the *Project Manager's* team.

3.3.2 Documentation Modification

a) The *Contractor* provides additional and amended pages, sufficient for all copies of manuals or document sets to ensure that they are complete, inclusive of detail such as final settings and modifications.

b) The *Contractor* updates the soft copies of all documentation on the engineering system to ensure that they are complete, inclusive of detail such as final settings and modifications.

c) Amendment information is forwarded to the *Project Manager*, within the period for reply, following receipt of agreement to equipment or system design modifications.

3.3.3 Documentation Control

a) Comprehensive document control of all documents is provided for the duration of the works
b) The document control system implemented, as a minimum contains the revision status of all documents in relation to the 'As required' and 'As Built' plant status.
c) Procedures, document control, flow diagrams and indexes are included in this system.
d) The documentation register contains the following information and is submitted monthly, in a Microsoft Excel format, to the *Project Manager*:
   - Documentation number (Employer and makers number)
   - Revision
   - Approval status
   - Location of documentation at that stage
   - Documentation description
e) All documentation submittals are accomplished with a documentation transmittal advice.

3.4 Other requirements of the *Contractor*'s design

3.4.1 Description of the Works

The scope of the project entails the following:

- Develop the concept design for the replacement of SCADA system
- Identify existing plant constraints and limitations with regards to the SCADA system replacement.
- Select best alternative solution (and technology) for the replacement taking into consideration Initial Cost, Reliability, Environmental conditions, Safety and Life-Cycle costing.
- Review of interfaces (C&I and Electrical, Cables, and other discipline if required)

- Interface all third party systems:
  - Fast Transfer System
  - Gas Turbine
  - Diesel Generator Control
  - EMDAS
  - C&I Units
- To cover the comprehensive design as well as perform Electrical and C&I engineering work necessary to render a full functional, reliable and compliant work.
- Align all misaligned Protection systems
- Provide a design that covers the following:
  - Design, Manufacture and, Factory Acceptance Test of the new SCADA system.
  - Deliver the SCADA system to Kendal Power Station
  - Test the SCADA system once on site
  - De-commissioning and removal of the existing SCADA system.
  - Install new SCADA system
  - Interface the new SCADA system with existing auxiliaries
  - Commission and test newly installed SCADA system

The project will cover the replacement of Substation SCADA system, which comprises of the following:

- Satellite S5 PLCs located in each substation and associated interfaces.
- Input and output modules and interfacing between PLCs and all switchgear panels.
- Interfacing between PLCs and redundant fibre bus.
- Testing of current fibre bus (OTDR Test including patch leads)
- Replace all network switches.
- EOD coordinator PLCs used for monitoring and display.
- EOD Mimic panel upgrade.
- EOD COROS HMI system.
- Clients used for control, monitoring and display.
- FMECA study report for Substation Automation System.

The Scope of Works also sets out the requirements for project management (such as documentation, safety, quality, environmental, programming, training), engineering and the contractor's design, procurement, construction and more.

3.4.1.2 Employer's Objectives and Purpose of the Works

The *Employer's* objective is to contract with a successful tenderer to complete the *works* for the project. The purpose of the *works* is to provide a new Substation Automation System (SAS) at Kendal Power Station for the MV boards, mitigating the risks experienced with the current system, by increasing the reliability, maintainability and availability of the system.

3.4.1.3 Engineering and the Contractor's Design

The *Contractor* produces a detail design, procures or manufactures, integrates & assembles, factory tests, transports to site, offloads, erects into position, installs, site integration tests, site acceptance test, commissions, certifies and hands over the entire *works,* to ensure a fully functional new Substation

Automation System for the MV boards. The *works* is to be located at Kendal Power Station, located in the Mpumalanga Province.

3.4.1.4 Existing Plant / System Description

The switchgear S5 PLCs are used for monitoring, indications, controls and alarms. Each substation is equipped with satellite S5 PLC that collects information from the boards and sends it through to EOD S5 co- ordinator PLC via the redundant H1 communication network. The HV Yard satellite S5 PLC collects information from the HV Yard and sends it through to EOD S5 co-ordinator PLC. The information from the S5 co-ordinator PLC is sent to the COROS System for display and monitoring. Figure 1 shown the network layout of the S5 PLC SCADA.

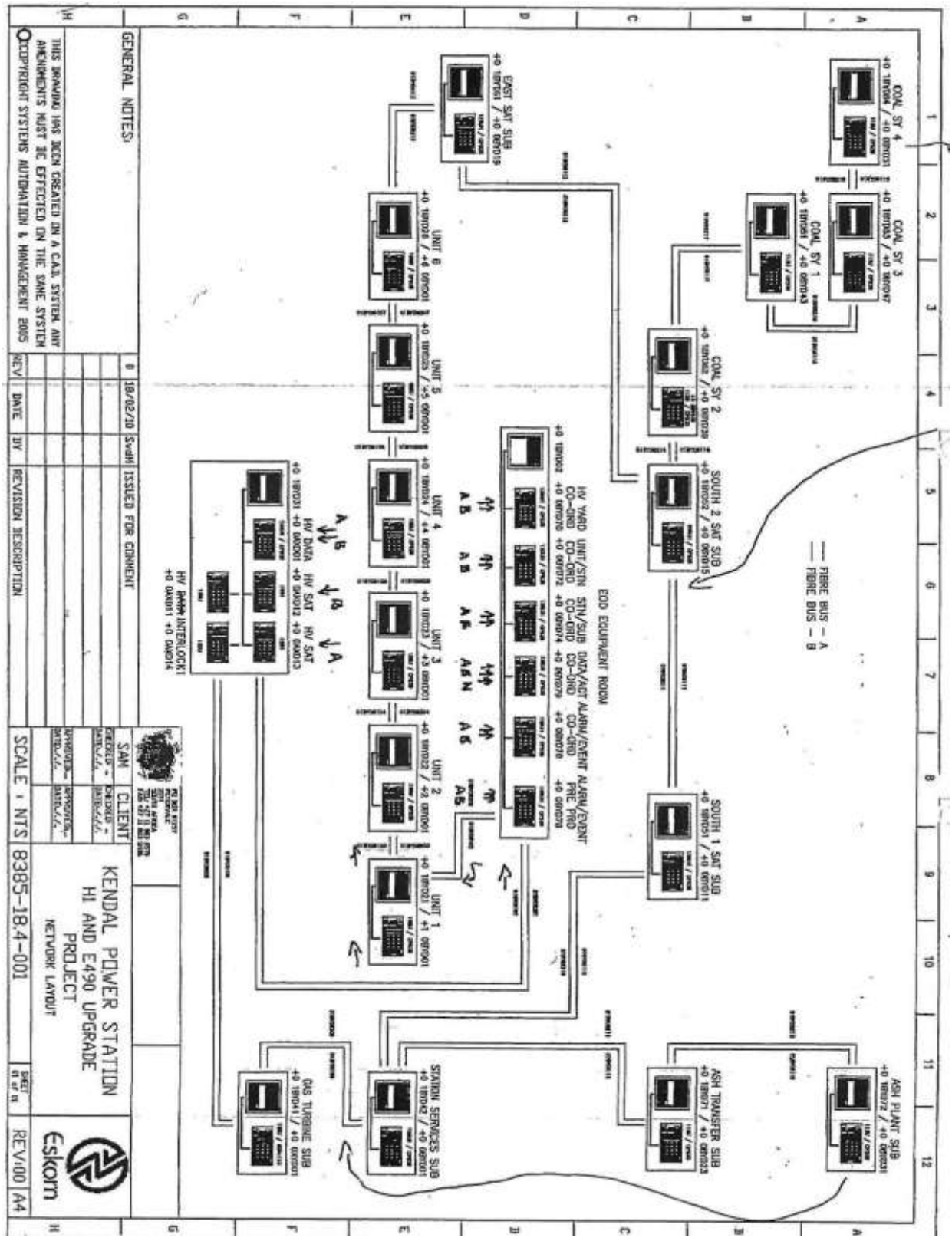

Figure 1 S5 PLC Network Layout

3.4.2 Substation Automation System (SAS)

3.4.2.1 Medium Voltage Switchgear Requirements

The Contractor to ensure that Medium Voltage shall comply with *Hawker Siddeley Switchgear Manual*.

3.4.2.2 Plant Coding and Labelling

Coding of the plant shall be based on the latest revision of 240-93576498 KKS Coding Standard and the Employer shall undertake the coding in line with its standards. The KKS coding shall be applied during the maintenance of the plant and cross referenced to all drawings, schematics, instructions and manuals. The Contractor shall be required to install missing KKS in plant.

The Employers KKS Standard shall be used to allocate codes to plant or system included in the Works. Plant Coding shall be undertaken by the employer as well as the following documentation to code:

Electrical

- Single line diagrams
- Electrical board general arrangements
- Cable schedule
- Cable block diagrams
- Logic diagrams

3.4.3 Plant Labelling

The Contractor shall also manufacture and install KKS labels to identified plant items as per list supplied by the Employer. Labels shall be manufactured and installed according to the Employer's KKS Plant Labelling and Equipment Descriptions Standard. The labelling standard shall be supplied as part of the enquiry documents.

3.4.4 Licences

a) All licenses covering the equipment, standard software and application software provided are provided for.

b) All licenses remain valid in the event of the failure and replacement of faulty equipment.

c) All licenses provided are valid for the entire life of the system being provided.

d) All licenses are site licenses for use at Kendal Power Station Site.

e) Installation disks are provided for all licensed software

3.4.5 Training and Technology Transfer

The Contractor is to provide the following formal training of the new Substation SCADA, to the Employer's personnel, including training material and manuals:
⊓ Operating (2 sessions)
⊓ Maintenance (2 sessions)
⊓ Engineering (2 sessions)

The Employer will provide a list of personnel to undergo formal training, as part of the delivery of the Works.

3.5 Use of *Contractor*'s design

Refer to core clause 22.1

3.6 As-built drawings, operating manuals and maintenance schedules

3.6.1 As-Built drawings

a) It is the *Contractor* responsibility to ensure all drawings are "As Built" before the *Works* is commissioned. All approved "as-built" drawings shall be handed over before commissioning of the works. Signed hard copy, approved by design engineer, accepted by Project/System Engineer and authorised by the Employer for new drawings.

b) All final drawings shall be handed over as follows and accompanied by the updated Master document register.

- Electronic MicroStation V8 natively drawn drawing file.
- Signed hard copies, approved by design engineer, accepted by Project/System Engineer, and authorised by the Employer (for new drawings).
- Scanned electronic file of the signed drawings in pdf format.
- Electronic files may be supplied on CD or DVD

3.6.2 "As Built" Documentation Package

a) "As Built"' documentation, as listed in Appendix 01 – VDSS and VGB R 171 "Provision of Technical Documentation (Technical Plant Data, Documents) for Power Plants" is supplied by the *Contractor* to the *Employer* at completion of commissioning of each C&I system.

b) 3 hard copies and 2 soft copies of As Built documentation shall be provided by the *Contractor* as part of the *works.*

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

3.6.3 Manuals

a) Often of the shelf items or modular systems come with a standard set of manuals. These manuals are normally sufficient, but if this is not the case typically for a need specific design, manuals needs to be compiled in line with the following requirements.

3.6.3.1 Maintenance Manuals

- The Contractor provides a maintenance manual with respect to their supply of the Works, which documents the following: detailed maintenance plans, frequency of maintenance and replacement parts that are required during routine maintenance. The Contractor provides the life expectancy of the equipment and components and maintenance spares required, with respect to their supply of the Works.
- The Contractor provides an installation procedure with the required installation software files where any computer which has major failure can be replaced and configured to be fully operational within short time.

Shall include as a minimum;

- Table of Content
- Revision sheet
- Overview
- Proposed maintenance strategy
- Maintenance procedures
- Proposed spares holding
- Illustrated parts catalogue

3.6.3.2 Operating Manuals

The Contractor provides operating manuals, developed by experienced Contractor personnel, for the operation of the designed system, in their supply of the Works. The operating manuals aim to assist the operators of the plant in the application and troubleshooting of the system.

a) Shall include as a minimum;
   - Table of Content
   - Revision sheet
   - Overview
   - Operating philosophy
   - Operating procedure (commissioning, stand-by, start-up, running, shut-down, etc.)
   - Standard isolation procedure
   - Alarm response procedure

3.6.3.3 Technical Manuals

The Contractor provides technical manuals, developed by experienced Contractor engineering / technical personnel, for the operation of the designed system, in their supply of the Works.
The technical manuals explain the details of the design and system, including detailed descriptions, AS BUILT drawings, diagrams, settings, parameters, logic diagrams and logic philosophies of the detail design. The technical manuals include troubleshooting guidelines.

4 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.

4.1 People

4.1.1 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.

4.1.2 BBBEE and preferencing scheme

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

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

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.

4.2 Subcontracting

4.2.1 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.

4.2.2 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.

4.2.3 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.

4.2.4 Attendance on subcontractors

State requirements for attendance on Subcontractors, if any

4.3 Plant and Materials

4.3.1 Quality

The *Contractor* responsibilities include but are not limited to the following:

a) The *Contractor* is accountable for the quality of the output and liable for any failures.
b) Implementation of their QMS on site
c) Administration of their QA/QC systems on site
d) On-and-offsite inspections
e) Weekly and monthly progress reporting on quality performance
f) The *Contractor* is responsible for defining the level of intervention of QA/QC or inspections in line with the *Employers* requirements.
g) The *Contractor* is responsible for defining the level of intervention of QA/QC or inspections to be imposed on his Subcontractor, suppliers and sub-suppliers and must ensure that these are in line with the *Employer's* requirements

h) Where Non-Conformance (NC) notifications are issued, the Contractor acknowledges receipt within the period of reply and proposes corrective and preventive actions to the Supervisor. The corrective and preventive actions will include the implementation and completion dates. Progress on all NCs notifications issued to the *Contractor* must be reported to the Supervisor on weekly basis.

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

a) There is no free issue for this contract, all other Plant and Materials are to be provided by the *Contractor*.

4.3.3 *Contractor*'s procurement of Plant and Materials

a) The *Employer* expects the *Contractor* to purchase good quality material and records of such may be requested by the *Employer* at any time.

4.3.4 Spares and consumables

a) The *Contractor* shall have enough spares to correct all defects picked during the project. Safety defects to be corrected within 24 hours and Normal defect 2 days. Defects during commissioning must be addressed with 24 hours.

4.4 Tests and inspections before delivery

Core Clauses 40 and 41 both make reference to the Works Information regarding tests and inspections. Specify any requirements here for any tests and inspections that are to be done by the *Supervisor* or Others before delivery to the Working Areas, particularly if such tests and inspections are to be carried out by agents of the *Employer* overseas.

2.3.3 Manufacturing

2.2.3 General Requirements

d) The Control System undergoes Factory Acceptance Testing (FAT).
e) The Employer has the right to appoint a representative or representatives to inspect all parts during manufacture and to be present at any of the tests specified.
f) The Project Manager is free to specify 'hold and witness points' during the fabrication and factory testing of the Control System.
g) The *Contractor* issues preliminary notification of hold and witness points to the Project Manager.
h) The *Contractor* confirms hold and witness points at least seven (7) days prior to the activity, as shown in the Accepted Programme.
i) Arrangements for witnessing inspections are made through the Project Manager.

j) A minimum of six (6) weeks' notice is given by the Contractor for inspections and is shown in the Accepted Programme.

4.4.1.2 Pre-FAT

a) The *Contractor* carries out a pre-factory acceptance test (Pre-FAT) at the Contractor's manufacturing facility in preparation for the FAT.

b) The Pre-FAT is shown in the Accepted Programme.

c) In addition to this Works Information, the *Contractor* tests and verifies the performance of the Control System, completely, against the following documents:

- IEC 62381 "Automation systems in the process industry - Factory acceptance test (FAT), site acceptance test (SAT), and site integration test (SIT)"
- Detailed Engineering design freeze documentation

d) The Contractor's Pre-FAT tests are documented as part of the Contractor's Quality Control procedures.

e) The *Contractor* submits the QC procedures, including the Pre-FAT results to the Project Manager prior to the commencement of FAT as defined in the – VDSS.

4.4.1.3 Pre-FAT Procedure

a) The *Contractor* prepares a detailed test procedure in preparation for the Pre-FAT.

b) The requirements of the Pre-FAT procedure are the same as that of the FAT procedure.

4.4.1.4 Pre-FAT Report

a) A Final Pre-FAT report is prepared by the *Contractor* that includes the following as a minimum:

- Test procedures used during Pre-FAT
- Detailed test results
- Discrepancies identified during the tests
- Resolution of the discrepancies
- Retests conducted and results thereof

b) The Contractor submits the Pre-FAT report to the *Project Manager* for approval.

c) Pre-FAT completion is achieved and the Control System is considered ready for FAT upon approval of the Pre-FAT report by the Project Manager.

4.4.1.5 FAT

a) In addition to this Works Information, the *Contractor* demonstrates that the Control System meets the requirements of: The Minimum Assessment and Testing Requirements (include tests per plan system, IEC 62381 and Detailed Engineering design freeze documentation and the philosophies.

b) The FAT is carried out at the Contractor's manufacturing facility.

c) The *Contractor* and the *Project Manager* witness the FAT.

d) All control system equipment supplied as part of the *Works* is tested at FAT.

e) The *Contractor* provides all facilities and simulation systems for FAT such that full testing of the Control System's functional logic can be undertaken.

f) The *Contractor* ensures that all Control System hardware and software is available and operational in time for the individual tests.

g) As a minimum, the following tests and inspections are performed during the FAT:

- Full testing of the Control System's hardware
- Mechanical and visual inspection and tests of all equipment
- Wiring and visual inspection of all cubicles' internal wiring
- Control System integrity and application tests
- All tests and inspections in accordance with IEC 62381
- All FAT tests and inspections defined in Appendix 06 – Minimum Assessment and Testing Requirements.

4.4.1.6 FAT Procedure

a) The *Contractor* prepares a detailed test procedure in preparation for FAT.

b) As a minimum, the FAT procedure identifies the following:

- Major test activities
- Comprehensive list and description of the individual tests to be performed
- Description of how the tests are to be prepared and conducted
- Test dates and durations
- Checklists for the purpose of documenting test results
- Acceptance Criteria
- Description of how the identified discrepancies will be processed
- Requirements for retesting.

4.4.1.7 FAT Report & FAT Completion

a) A Final FAT Report is prepared by the *Contractor* that includes the following as a minimum:

- Test procedures used during FAT
- Detailed test results

- Discrepancies identified during the tests and resolutions thereof
- Retests conducted and results thereof
- FAT certificate

b) The *Contractor* submits the Final FAT Report to the *Project Manager* for acceptance.

FAT Completion is achieved upon acceptance of the Final FAT Report by the *Project Manager.*

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

The *Contractor* Supplies, installs, maintains and removes all temporary construction facilities and utilities necessary to provide the *Works* if required.

4.6 Cataloguing requirements by the *Contractor*

a) Required Cataloguing will be done by the *Contractor* in accordance with Eskom standards, Requirements will be provided by the Employer in due time.

5 Construction

5.1 Temporary works, Site services & construction constraints

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

a) Access to the site is controlled and it is governed by the terms and condition lay down by Kendal Power Station security officials. The proposed site will be shown to the *Contractor* during the site meeting or clarification meeting by the *Employer.*

b) The *Contractor* liaises with SHE practitioner/Officers for SHE induction prior work to commence. During Safety induction, site access permits with a copy of the medical and a certified ID copy/passport (not older than 3 months) should be handed to the SHE Practitioner/Officer for approval.

c) The *Contractor* employees will take the signed site access documents to security reception official in order to finalize their access.

d) The *Contactor* ensures that all its employees carry their site access forms with them all the time.

e) The *Contractor* is subjected to alcohol testing on a daily basis.

f) The *Contractor* submits his application for vehicle permit to the *Project Manager*. The personnel and vehicles entering and leaving the site are subjected to routine searches.

g) The *Contractor* ensures that a tool list is available on the day of arrival and that all tools are captured on the tool list. The tool list will be handed over to the Reception Security official that will stamp the tool list. The tool lit will be kept safe and will be used when tools need to be removed from site. The message should be handed over to any.

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

a) Main access roads are surfaced and complete and may be used by the *Contractor* with the necessary care. The *Employer* maintains the Site roads, described above, to a fair condition. Any costs incurred by the *Project Manager* from damage caused to underground

services, structures, etc. as a result of the *Contractor* not using the prescribed routes is recovered from the *Contractor*.

b) The Contractor provides temporary access points from the prescribed routes and roads to the points where the *Contractor* is required to perform work if required, having first obtained permission in writing from the *Project Manager.*

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

5.1.3.1 Site regulation and access Control

a) Access and Security control shall be done according to the Eskom Access Control Policies.

b) Employees, Contractors, and visitors shall be subjected to induction training and substance abuse test when entering Eskom sites, or as and when required while on Eskom sites.

c) It may be required that prior to access being granted that person(s) complete the required training e.g. plant access training, employee training, occupational health and safety training or any other prescribed training.

d) The Principal Contractor shall subject its employees to complete Criminal clearance verifications with the South African Police Service (SAPS) Criminal Record Centre (CRC) or accredited supplier linked to SAPS AFIS system and provide proof to security delegated team before access can be granted.

e) The *Contractor* is to submit proof of verification record(s) (Security clearance) from SAPS or accredited supplier linked to SAPS AFIS system not older than thirty (30) days, as part of Risk Management process to curb any threats against the Installation. It is compulsory for these documents to be submitted to Security for verification before access to site is granted. Only individuals with clear criminal records will be considered.

f) The *Contractor* is required to submit the SAPS Clearance Certificate obtained by their employees along with a copy of his/her Identity Document or Passport to the site Security Manager.

g) The following are prohibited items and shall not be allowed on Eskom sites unless the necessary authorisation for possession has been obtained.

- Firearms (excludes Eskom official firearms and firearms issued to the South African Security Forces).
- Liquor/Alcohol
- Dangerous weapons
- Drugs
- Any other items that may be declared prohibited

5.1.4 Health and safety facilities on Site

a) The *Contractor* provides a First Aid service and SHE representative to his employees. In the case where these prove to be inadequate, like in the event of serious injury, the *Employer's* Medical Centre and facilities will be available. Outside of the Employer's office hours, the *Employer's* First Aid Service are only available for serious injuries and life threatening situation. The *Employer* recovers the cost incurred, in the use of the above *Employer's* facilities from, the *Contractor.*

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

a) As per the following:
   - Kendal Waste Management Procedure
   - National Environmental Management Act (NEMA, Act No.107 of 1998
   - National Environmental Management waste Act(NEMWA, Act No. 59 of 2008)
   - National Water Act 36 of 19986
   - National Environmental Management Biodivesrity Act 10 of 2004
   - National Veld and Forest Fire Act 101 of 1998
   - National Environmental Management Air Quality Act 39 of 2004
   - Environmental Management Plan (EMP)
   - Any Applicable South African legislation(at national, provincial and municipal level)

5.1.6 Cooperating with and obtaining acceptance of Others

a) The *Contracto*r is to take into consideration that this is an operational site and is required to work with others and should also comply to any requirements for liaison with and acceptance from statutory authorities or inspection agencies.

5.1.7 Publicity and progress photographs

a) The taking of photographs at Kendal Power Station including the Project *Works* is restricted and subject to the approval of the *Project Manager.*

b) For progress Reporting Requirement, the *Project Manager* may prohibit the taking of such photographs and/or require that all such photographs be taken by an official Employer photographer. In the latter event, the *Contractor* is required to make arrangements directly with the photographer for the taking of the photographs required by the Contractor.

5.1.8 *Contractor*'s Equipment

a) The Contactor shall supply all Equipment required to fully, and successfully, meet the requirements stated in this document.
b) All equipment used by the *Contractor* in providing the *Works* shall comply with the General Machinery Regulation 4 of the OHS Act.(Act 85 of 1993).
c) The *Contractor* must keep daily records of his equipment used on site and the Working Areas with access to such daily records available for inspection by the *Project Manager* at all reasonable times.

5.1.9 Equipment provided by the *Employer*

a) No Equipment will be supplied by the *Employer*; however the Employer does reserve the right to negotiate with the *Contractor* that different equipment be used of another origin for whatever purpose that may become apparent at the time.

5.1.10 Site services and facilities

5.1.10.1 Supply of Electricity

a) Electricity will be made available for construction purposes free of charge from power points which will be indicated by the *Project Manager*. The *Contractor* is responsible for the provision of the reticulation system from the point of supply. Both 220 (AC) Volt and 380 (AC) Volt are available on request. All points of supply requested by the *Contractor* are provided in terms of quantity and location at the discretion of *the Project Manager.*

b) No guarantees of power supply quality are given and power supply breaks of some duration may occur without warning. Planned outages are also a possibility. The *Contractor* makes arrangements at his own expense to improve continuity and quality of power where

necessary for any reason and no claim of any nature relating to power failures is considered.

c) No connection is made to the permanent installation at Kendal Power Station without the prior acceptance of the *Project Manager*.

d) The power supply is managed in accordance with the latest revision of the Eskom safety regulations i.e.:
   - 32-846, Operating Regulations for High-Voltage Systems
   - 36-681, Generation Plant Safety Regulations
   - COC for the site installation is required prior to power being switched on.

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

a) The *Project Manager* designates the working area boundaries limits and assigns for the *Contractor's* use access roads, Parking areas, storage areas, existing facilities areas, and construction areas. The *Contractor* does not trespass in or on areas not designated for his work.

5.1.11 Survey control and setting out of the *works.*

The Project Manager designates the working area boundary limits and assigns to the Contractor's use access parking areas, storage areas, existing facilities areas and construction areas. The Contractor does not trespass in or on areas not designated for his work.

5.1.12 Control of noise, dust, water and waste

a) The *Contractor* maintains a high standard of cleanliness during the conduct of his activities at Kendal Power Station. This includes areas allocated for storage of materials, site offices etc. to the satisfaction of the *Project Manager*. The *Contactor* keeps these areas clean and free from accumulation of waste material and refuse regardless of the source.

b) The *Contractor* ensures during sweeping and dusting, that a minimum amount of dust is liberated into the atmosphere. Cleaning by vacuum cleaners is preferred and the use of compressed air for cleaning is prohibited.

c) The *Contractor* is responsible for the prompt removal of all waste to a designated disposal area. The disposal area will be on or in the vicinity of the Power Station and be indicated by the *Project Manager.*

d) For the purpose of hereof, “Waste” any matter, whether liquid or solid or any combination thereof, which is a b product, emission, residue or remainder of any process or activity carried out in connection with the works and which is not reused on the Site in the in the ordinary course of carrying out the Works with seven days of production.

e) All waste can be contained in either a bin or container placed on a temporary waste site which the *Project Manage* Identifies. The waste is removed as soon as possible, but in any event at least once a week. No burning of waste and littering is allowed at the Power Station.

f) Hazardous waste is dealt with in accordance with the safety, health and/or environmental requirement of the works and *Contactor* is solely responsible for the proper disposal thereof. Hazardous waste will be disposed of at to authorised landfill site. Waste manifest will be kept for record keeping and hand over at the end it the project. The *Contractor* notifies the *Project Manager* of all chemical substances coming to site and keeps an inventory of the chemicals.

5.1.13 Sequences of construction or installation

5.1.13.1 Procurement, Erection and Installation

a) This stage consists of the installation, on-site inspection and testing of all equipment forming part of the works.
b) This stage consists of both pre-outage and outage work.
c) Erection and installation of the relevant equipment does not begin until:
   - The detailed engineering documentation for the section of the plant concerned has been accepted by the Project Manager.
d) Quality inspections and tests are carried out by the *Contractor* after erection to prove the compliance of the installation with the Works Information and the Detailed Engineering design freeze documentation.
e) Erection and installation is only considered complete once the quality inspections and tests for the installation concerned have been accepted by the Project Manager.
f) The first type of any erection and installation activity is accepted by the Project Manager before any repeat installations of this type of erection and installation activity.

g) The first type of any erection and installation activity is used as reference – in conjunction with this Works Information and the detailed engineering design freeze documentation – upon which the quality and completeness of all repeat installations are evaluated by the Project Manager.
h) The Employer reserves the right to appoint representatives to inspect all parts during erection and to be present at any of the quality inspections and tests.
i) The Project Manager is free to specify hold and witness points during the installation and testing stages of the project.
j) The *Contractor* gives at least ten working days advance notice to the Project Manager of holds and witness points.
k) The *Contractor* confirms hold and witness points at least seven working days prior to the test activity.

5.1.13.2 Pre-installation Work

a) The *Contractor* provides a commissioning plan prior to undertaking any pre-outage work.
b) The *Contractor*'s commissioning plan must take into account the production risks.
c) The following work is completed by the *Contractor* prior to system changeover:
   - Installation of network cabling
   - Installation of network cabling infrastructure
   - Installation of network cabinets

5.1.13.3 Site Integration Test (SIT)

a) The SIT only begins once the following has occurred:
   - All Common Control equipment has been installed in the final locations and connected to permanent power supplies
   - All interfaces to 3rd Party Systems have been implemented
b) The SIT is carried out before plant commissioning commences to ensure:
   - Correct performance of the Control System
   - Safety of plant and personnel
   - Compliance with the Works Information and the detailed engineering design freeze documentation
c) As a minimum, the SIT testing and inspection activities provided by the *Contractor* consists of as a minimum:
   - Site integration and site acceptance activities defined in IEC 62381
   - Testing activities as a minimum shall be done as defined during the design test specification “Assessment and Testing Requirements”.

d) In the event of an error in any test (hardware or software) the fault is logged, analysed and resolved.
e) The *Contractor* is allowed to rectify the fault and retest for the full duration on condition that the *Project Manager* finds the fault to be minor.
f) Major faults such as process server failure, System stall and network failure or major faults as determined by the *Project Manager* may lead to the termination of the SIT.
g) The *Contractor* rectifies the fault and re-starts the SIT after proving the compliance and performance of the rectified piece of equipment.

5.1.14 Giving notice of work to be covered up.

The *Contractor* provides a notice of work to be covered up to the *Supervisor.*

5.1.15 Hook ups to existing works

The adjacent plant and equipment may not be modified without written permission from the *Project Manager*. The *Contracto*r complies with Eskom Life Saving Rules and will report any non-conformance.

5.2 Completion, testing, commissioning, and correction of Defects

5.2.1 Work to be done by the Completion Date

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.

	Item of work	**To be completed by**
	Complete approved Configuration Management with as build drawing.	Within 5 days after Completion
	Performance testing of the *works* in use as specified in paragraph 5.2.8 of this Works Information.	See performance testing requirements.

5.2.2 Commissioning

5.2.2.1 General

a) Commissioning is defined as bringing into service all items of the works and meeting the functional requirements and performance criteria of the Specification.

b) The *Contractor* shall commission all interfaces to control equipment provided by the Employer.

c) Commissioning shall include all testing and verification of the stated performance criteria with:

- Appendix 06 - Minimum Testing and Assessment Requirements.
- The detailed engineering design freeze documentation

d) The *Contractor* follows the phases of commissioning as defined in IEC 62337.

e) Commissioning for any sub-section of plant does not start until all the pre-requisite activities for that sub-section of plant have been completed and approved as completed by the Employer.

f) Commissioning does not start until the commissioning documents as defined in Appendix 01 – VDSS has been approved by the Employer.

g) The equipment forming part of the works is installed and completed in all respects by the dates stated in the Approved Programme.

h) The *Contractor* tests the interfaces that include alarms and controls from MV and LV Switchgear for process related circuits.

i) The *Contractor* provides sufficient personnel for the satisfactory and timely commissioning of equipment that forms part of the control system.

j) The *Contractor* co-operates with the Employers' Representative(s) and Other Project Contractors in all commissioning activities of the plant sections for which the Employer will supply the portion of equipment, systems, and control and instrumentation systems.

k) The *Contractor* provides all the test equipment for the commissioning of control system.

l) The *Contractor* certifies that equipment is in a suitable and safe condition for use before it is placed in service.

5.2.2.2 Cold Commissioning

a) As a minimum, the cold commissioning activities conducted by the *Contractor* shall consist of:

Electrical and instrumentation loop check activities as defined in IEC 62382.
Testing activities defined in Minimum Assessment and Testing Requirements.
Drive interface checks.
Testing of system functionality.

b) Cold commissioning excludes provision of actuation power and process medium in the plant.

5.2.2.3 Functional Tests

a) The functional tests forms part of cold commissioning and includes checking of all:

- time to send a control command/message (< 20 ms)
- time to send or receive a protection message (< 4 ms) (port to port time)
- time to send and receive an interlocking message (< 20 ms)
- time to display a state change (< 500 ms)
- time to display analogue input (< 500 ms)
- time to display alarm (< 500 ms)
- time to change HMI screen view (< 1000 ms)
- time to change control mode (e.g. from local to remote) (< 50 ms)
- automation function execution time (< 20 ms) (calculation of algorithm, excluding the field execution)
- boot up of the complete system and its respective components do not take longer than 30 seconds. The Contract supplies typical boot up times of other systems of similar size/complexity

5.2.2.4 Hot Commissioning

a) The *Contractor* submits the Cold Commissioning test results to the *Project Manager* for approval.

b) The *Contractor* requests the commencement of hot commissioning upon approval of cold commissioning results.

c) Hot commissioning is where the plant processes are placed into operation in conjunction with the control system and 3rd party system(s).

d) The commissioning activities are carried out in conjunction with the *Employer.*

e) The *Contractor* is responsible for the hot commissioning of all equipment forming part of the works and the interfaces to 3rd party systems.

f) The *Employe*r is responsible for the preparation of the plant for hot commissioning.

g) Commissioning is at the discretion of the *Employer* for equipment which cannot be commissioned separately.

h) In cases where various components are connected to form an integrated system, the *Contractor*, at the time of commissioning, carries the responsibility for the correct functioning of the whole of the system.

i) If a defect is identified in the equipment interfacing to, or external to the Contractor's scope the *Contractor* informs the *Employer.*

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

a) The *Contractor* gives the *Project Manager* written notice that the *works* are ready for energisation. Such notice will suit the requirements of the *Employer* but will not, unless otherwise agreed, be less than **48 hours or more than fourteen (14) calendar days.**

b) No alterations or adjustments will be made to the *works* after functional checks are done without the Project Manager's written permission.

c) At this state the following must have been achieved;
- Installation and pre-commissioning completed
- Testing report and the associated certificates received
- signed erection and safety clearance certificates
- Final Draft of the Technical, Operating, Maintenance manuals delivered
- All quality Control Plan (QCP) documentation received.

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

Clause 43.4 requires that the *Project Manager* arranges for the *Employer* to allow the *Contractor* access to and use of a part of the *works* which has been taken over if needed to correct a Defect.

5.2.5 Performance tests after Completion

5.2.5.1 Operational Acceptance Test (OAT)

a) Commissioning is concluded with the Operational Acceptance Test (OAT).

b) The *Contractor* requests commencement of operational acceptance tests from the Employer.

c) OAT is done on the system as a whole.

d) The *Contractor* produces a detailed OAT test procedure **28 days** in advance for approval by the Project Manager.

e) The final OAT Report is prepared by the Contractor.

f) The *Contractor* submits the final OAT Report to the *Project Manager* for approval.

g) Commissioning Completion is achieved upon approval of the OAT Report

5.2.5.2 Technical Documentation

a) The documentation requirements cover all stages of the works.

b) All technical documentation is numbered and classified according to the IEC 61355 and VGB B 103. And comply in full with the Kendal Power Station configuration management requirement for projects.

c) Soft copies and hard copies of each document specified in VDSS are provided at the stages defined in VDSS.

d) All documentation is accessible in paper form and addressable in databases.

e) All documentation is in English.

6 Plant and Materials standards and workmanship

The *Contractor* complies with all standards, specifications and regulations as listed within this Works Information. The works will be carried out in accordance with the latest edition of the specified standards or other standards and codes where applicable.

6.1 Electrical & mechanical engineering works

Refer to section 3.4

7 List of drawings

7.1 Drawings issued by the *Employer*

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

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

Drawing number	Revision	Title
7982-18.4-002		EOD COROS Upgrade - Network Layout
8385-18.4-001		H1 and E490 Upgrade – Network Layout
0.64/12388 Sheet 1		Station and Unit MV and LV Single Line Electrical Diagram
0.64/12388 Sheet 2		Station and DC Single Line Electrical Diagram
0.64/12388 Sheet 3		CSY MV and LV Single Line Electrical Diagram