	Report	Technology
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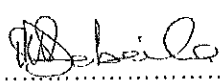

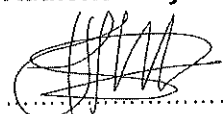
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C3.1: EMPLOYER'S WORKS INFORMATION

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1 Description of the works

1.1 Executive Overview

The *Contractor* Designs, Engineers, Installs and Commissions the expansion of the fire detection system for Kriel Power Station. The following high level areas are to be covered: Battery rooms, CW pump houses, Auxiliary plant switchgear rooms, Outside plant control room, outside plant workshops including Rotek building, Park homes by Soweto Building, conveyor boards substations, ash handling system, Water treatment plant auxiliaries and Kwanala boards switchgear rooms. The high-level scope of the *works* includes:

- Engineering,
- Design,
- Procurement,
- Factory acceptance testing,
- Delivery and off-loading at site,
- Site acceptance testing, storage,
- Installation,
- Testing,
- Commissioning,
- Decommissioning where necessary,
- Optimisation and
- As-built documentation for Kriel Power Station's Fire Detection System areas as mentioned above most of who are on the auxiliary plants.

The Fire Detection System is used for the monitoring and detection of any fire occurring within the specified Eskom Kriel Power Station premises.

The *Contractor* provides software licensing required for the *works*. This includes licensing requirements for all software forming part of installed system.

The *Contractor* provides for software installations and ensures all systems are updated to the latest version at completion including hardware.

All equipment and documentation forming part of the *works* are codified and plant equipment is labelled according to the requirements specified.

The *Employer* can use the *Contractors* design of the *works* at any given point in time, its information, design, for the purpose of construction and modification throughout the life of the plant.

The *Contractor* provides and performs all the *works* necessary for making the site ready for the new installation. The *works* includes all the activities but are not limited to the following, decommissioning, removal, and packaging, storing and transporting and sealing all the cable entries ways, which is affected by this *works*.

The Employer will provide scaffolding.

The *Contractor* provides all the necessary tools and equipment, which are required to perform the *works*.

The *Contractor* provides training to all the Staff as indicated by the *Employer's* as part of this *works*.

1.2 Employer's objectives and purpose of the works

1.2.1 Background

Kriel Power Station is a coal-fired power station built in 1979 and is situated in Mpumalanga. It has 6 units, each capable of providing 500 MW sent out to the Eskom grid. It is a base-load power plant with a total station capacity of 3000 MW's. The Common Plant is responsible for all auxiliaries required by the units such as water supply, and coal, dust and ash handling. On the Common Plant, the FDS was never installed; as such, this was an audit finding because there is high likelihood of fire. The coverage in these areas will form part of the expansion of the existing FDS with the monitoring remaining at EOD.

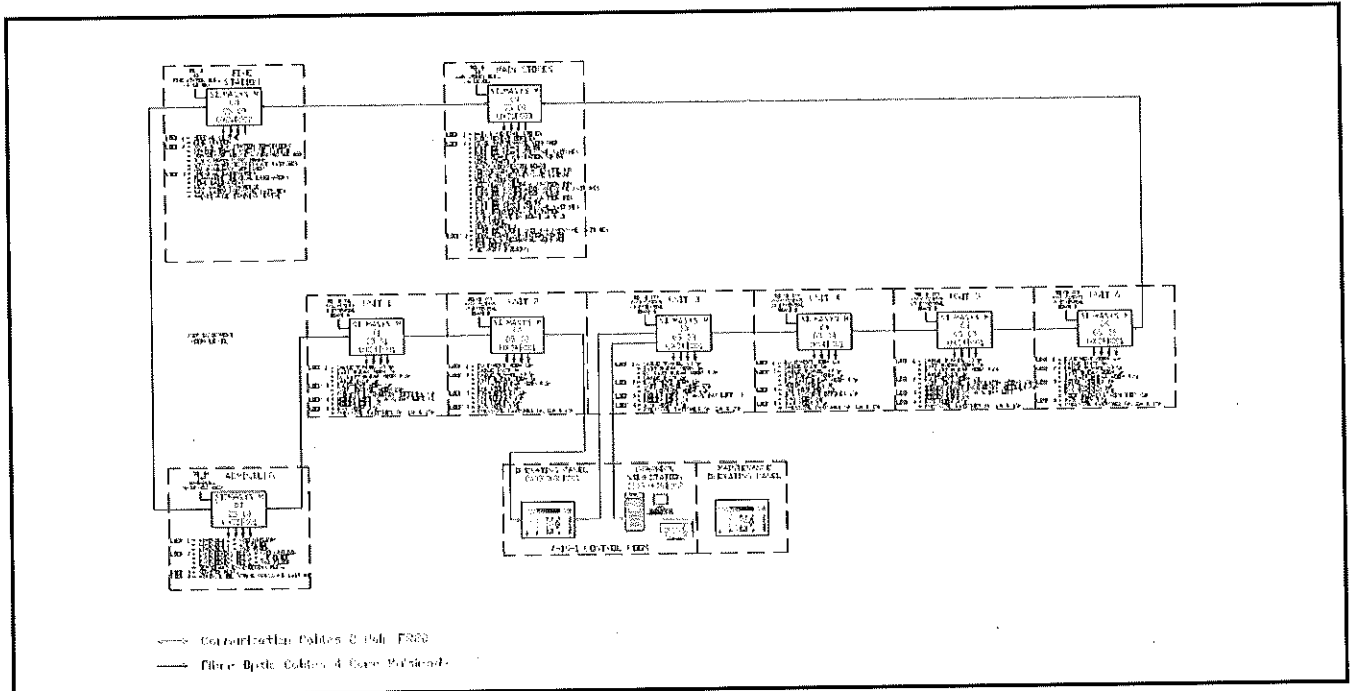


Figure 1: Current Network Configuration

The network is configured in a ring topology to ensure communication in both directions. The currently installed panels have at most four loops installed, however this can be expanded to 24 loops allowing the addition of more elements.

1.2.2 Objectives

The objectives of the FDS expansion projects is to cover various areas at Kriel Power Station that have been identified as areas where fire damage is possible however these areas are not equipped with the fire detection system. Hence, the currently installed Fire Detection System needs to be expanded to include the areas that require it and have nothing installed.

1.3 Interpretation and terminology

1.3.1 Definitions

Computer Backup	A full backup of all boot configurations, operating systems and other installed software packages such that the computer concerned can be restored to a fully functioning state as of the date of the backup capture
Control System	The control system consists of the Operating system, Engineering system, Process Automation system, Protection Automation system, Operating & Engineering network, Automation Network, network management system,

	User management system and Interfaces to 3 rd Party systems that are specific to a particular plant
C&I Rooms	The rooms used to house the control system
Engineering System	The system via which the control system is fully engineered, maintained and configured
Engineering Tools	All diagnostic, maintenance, configuration and engineering software for every aspect of the control system. Engineering tools also include the firmware management software and any software used during design of the system
Engineering Workstation	The single human interface via which the relevant basic engineering tools are accessed with the specified number of operating display units and pointing devices
Field Cabling	All the cabling between the field equipment and first junction and/or splitter box
Field Equipment	Instrumentation, Junction Boxes.
Functional Logic	The control logic – inclusive of all sequence control, analog control logic, interlocks, etc... - that is contained in the automation system(s)
Functional Logic Diagrams	Diagrams depicting systems in circuit diagrams using functional logic symbols.
HMI/GUI	The human interface used for the operation and monitoring of the a particular plant's C&I system
Machinery protection system	Consists of the transducer system, signal cables, the monitor system, all necessary housings and mounting fixtures, and documentation
Managed Network Switches	Switches that can be managed by one or more methods to modify the operation of the switches
Network Cabling	All the cabling that forms part of the automation network, operating & engineering network and common network
OEM	The OEM refers to the original equipment manufacturer. Within the context of the project it refers to the FDS manufacturer (Siemens/MZ Security cc), and is clarified in context of the work.
OEM best practices	Includes all of the OEM standards, best practices, guidelines and QA practices
Operator Workstation	The primary interface of the operating plant personnel via which the HMI is accessed with the specified number of operating display units and pointing devices
Plant Information	This includes all information from Kriel Power Station
Power Supply Cabling	All the cabling required to power field equipment
Specification	The document/s forming part of the contract in which are described the methods of executing the various items of work to be done, and the nature and quality of the materials to be supplied and includes technical schedules and drawings attached thereto as well as all samples and patterns
Trunking	A rigid structure supporting a number of automation network cables
Trunk Cabling	All the cabling between the junction boxes or groupings of field cables and the automation system(s)

1.3.2 Abbreviations

Abbreviation	Meaning given to the abbreviation
AKZ	Power Plant Coding System
C&I	Control and Instrumentation

FDS	Fire Detection System
CQP	Contract Quality Plan
DMS	Document Management System
DMZ	De-Militarised Zone
ESP	Electronic Security Perimeter
FAT	Factory Acceptance Test
GUI	Graphical User Interface
GA	General Arrangement
HMI	Human Machine Interface
HVAC	Heating, Ventilation and Air Conditioning
ITP	Inspection and Test Plan
LAN	Local Area Network
NEC	New Engineering Contract
MW	Megawatts
OAT	Operational Acceptance Test
OEM	Original Equipment Manufacturer
OHSA	Occupational Health and Safety Act
OS	Operating Workstation
PIS	Plant Information System
PPE	Personal Protective Equipment
QA	Quality Assurance
QAP	Quality Assurance Programme
QC	Quality Control
QCP	Quality Control Protocol
QMP	Quality Management Programme
SHEQ	Safety, Health, Environment and Quality
SAT	Site Acceptance Test
SIT	Site Integration Test
UPS	220V Uninterruptible Power Supply
UTM	Unified Threat Manager
VDSS	Vendor Document Submission Schedule

WBS	Work Breakdown Structure
WTP	Water Treatment Plant

2 Management and Start Up.

2.1 Management meetings

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

Title and purpose	Approximate time & interval	Location	Attendance by:
Kick off meeting	Prior commencement of work on site.	Kriel Power Station, Projects department	<i>Employer, Contractor, Supervisor</i>
Risk register and compensation events	As soon as the needs arises	Kriel Power Station, projects department	<i>Employer, Contractor, Supervisor</i>
Overall contract progress and feedback	Weekly	Kriel Power Station, Projects department	<i>Employer, Contractor, Supervisor,</i>

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*. The person convening the meeting within five days of the meeting shall submit records of these meetings to the *Employer*.

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 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

- All contractual correspondence must be in the form of a letter or form attached to an email and not as a message in an email itself.
- Where appropriate the correspondence includes the *Employer's* reference and is delivered as a single package
- All communications from the *Contractor* are numbered sequentially with a prefix as advised by the *Employer*. The *Employer* responds in like manner to a maximum of two address formats provided in writing by the *Contractor*.
- The prefix is decided upon at the kick off meeting.

General

All documentation shall be controlled as per the requirements of the Supplier Contract Quality Requirements Specification QM58. All existing documentation that is affected by the **Expansion of The Fire Detection System Project** shall be updated as part of the documentation of the project.

The documentation requirements cover the various phases of the works, from the engineering phase, through installation and the commissioning, operating, maintenance and training phase of the project. Comprehensive document control of all documents is provided for the duration of the works.

The documentation register contains the following information and shall be submitted monthly to the Employer:

- Documentation number (Employer and maker's number),
- Revision,
- Approval status,
- Location of documentation at that stage,
- Documentation description.

All documentation submittals are accompanied by a documentation transmittal advice.

Microsoft Office 2007 or later version soft copies, together with hard copies of each document, to be provided.

All new documentation shall be registered on the Kriel Power Station Documentation system.

Kriel Power Station shall issue all new document numbers.

The document control system contains, as a minimum, the revision status of all documents in relation to the 'As Built' plant status.

2.2.1 Drawings

It is a requirement of this project that all drawings, be produced by the Tenderer on a CAD system, the preferred system being Microstation (*.DGN) or AutoCAD (*.dwg or *.dxf).

2.2.2 As-Built Plant & Control Room Drawings

All the documents which will be affected by this project will be updated by the *Contractor*.

- Rack Layout Drawing;
- Cable schedules for routing and racking Information;
- Termination Diagrams; and
- Implemented software and hardware design.

2.2.3 Manuals

The following manuals are submitted by the *Contractor* to the *Employer* (both in electronic and hardcopy form) as a minimum:

- Operating Manuals;
- Maintenance Manuals;
- Technical Manuals;
- Training Manuals; and
- Detail design drawings.

2.2.4 Plant Codification

Kriel Power Station Plant coding shall conform to AKZ-KKS Plant Codification Standard – ECM0005.

Plant Labelling shall conform to Plant Labelling Standard – ECM0004.

The Contractor shall provide codification for all the equipment supplied (with guidance from Design and Specification) as part of works and submits to the Employer for approval.

All labels are made from anodised aluminium and are pop riveted in place.

All cable labels are made as per the Kriel Labelling Specification – ECM0004 and AKZ-KKS Plant Codification Standard – ECM0005.

2.3 Health and safety risk management

All service providers appointed to render any services within Eskom Kriel Power Station are required to comply with the station's safety requirements.

2.3.1 Employer's Health and Safety Requirements

The *Contractor* acts in accordance with the health and safety requirements stated in the Works Information.

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

- a) the provisions of the Occupational Health and Safety Act 85 of 1993 (as amended) and all regulations in force from time to time in terms of that Act ("the OHSA"); and
- b) the Eskom "Safety, Health and Environmental Requirements for Contractors" document attached to the Works Information (as amended from time to time) and such other Eskom Safety Regulations as are applicable to the Works and are provided in writing to the *Contractor* (collectively "the Eskom Regulations"). The Eskom Regulations may be amended from time to time by the *Employer* and all amendments will be provided in writing to the *Contractor*. The *Contractor* complies with the provisions of the latest written version of the Eskom Regulations with which it has been provided; and
- c) The health and safety plan prepared by the *Contractor* in accordance with the SHEQ Requirements. (The OHSA and the Eskom Regulations are collectively referred to as the "SHEQ Requirements".)

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

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

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

- I. Conduct health and safety audits regarding all aspects of compliance with the SHEQ Requirements, at any off-site place of work, or the site establishment of the *Contractor*;

- II. Refuse any employee, Sub-Contractor or agent of the *Contractor* access to the premises if such person has been found to commit an unsafe act or any unsafe working practice or is found not to be qualified or authorised in terms of the SHEQ Requirements;
- III. Issue the *Contractor* with a stop order should the *Employer* become aware of any unsafe working procedure or condition or any non-compliance with any provision of the SHEQ Requirements.

The *Contractor* immediately reports any disabling injury as well as any threat to health or safety of which it becomes aware at the Works or on the Site to the Employer and to the Safety Risk Management office.

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

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

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

The *Contractor* hereby indemnifies the *Employer* and holds the *Employer* harmless in respect of any and all loss, costs, claims, demands, liabilities, damage, penalties or expense that may be made against the Employer and/or suffered or incurred by the *Employer* (as the case may be) as a result of, any failure of the *Contractor*, its employees, agents, Sub-Contractors and/or mandatories to comply with their obligations in terms of this clause 18, and/or the failure of the Employer to procure the compliance by the *Contractor*, its employees, agents, Sub-Contractors and/or mandatories with their responsibilities and/or obligations in terms of or arising from the OHSA.

2.3.2 Safety of Workers

- The Contractor ensures the safety of all persons working in the Site. Any hot work including welding will be applied for in accordance with a permit to work system. No welding will be allowed on site unless permission is granted in writing by the *Employer*.

All welding, flame cutting and grinding work is properly screened to protect persons from arc flashes or eye injuries. Fire blankets are fitted over the scaffolding planks and platforms. Precautions are taken to prevent any objects welding or grinding splatter from falling.

2.3.3 Fire Protection

- The *Contractor* shall ensure that adequate firefighting apparatus is provided at all his work sites, and that his staff is trained in the use of this apparatus.

The *Contractor* takes precautions to prevent any occurrence of fires or explosions while carrying out any work near flammable gas and liquid systems. Any tampering with the *Employer's* fire equipment is strictly forbidden.

All exit doors, fire escape routes, walkways, stairways, stair landings and access to electrical distribution boards must be kept free of obstruction, and not be used for work or storage at any time. Firefighting equipment remains accessible at all times.

In case of a fire, report the location and extent of the fire to the Electrical Operating Desk at extension 2555 or 017 615 2555.

Take the necessary action to safeguard the area to prevent injury and spreading of the fire.

2.3.4 Asbestos

- The *Contractor* does not disturb any thermal insulating material on the plant until it has been positively identified as not containing asbestos. Approval is obtained from the Supervisor before any thermal insulation is disturbed.

All stripping of asbestos material is undertaken strictly in accordance with the *Employer's* Standard, SAP 0022, available from Safety Risk Management.

The *Employer* advises the *Contractor* whether areas that are to be stripped of lagging have been identified as containing asbestos.

The *Contractor* is obliged to ascertain from the *Employer* in advance whether areas required to be stripped, are non-asbestos. Any *Contractor*, other than the *Contractor* appointed to remove asbestos strips no lagging material containing asbestos fibres.

The *Contractor* appointed to remove asbestos, does not begin removal without first obtaining the necessary permission from the Deputy Director of Labour and the *Employer*.

Specific attention must be given to the Job Bulletin "Safe Measures Regarding Asbestos or Asbestos Contaminated Material" (06 – 2004).

Asbestos is present on the site and asbestos areas are clearly marked.

2.3.5 First aid

- The *Contractor* provides a First Aid service to his employees and Sub-*Contractors*. In the case where these prove to be inadequate, like in the event of a serious injury, the *Employer's* Medical Centre and facilities will be available.

Outside the *Employer's* office hours, the *Employer's* First Aid Services are only available for serious injuries and life threatening situations.

The *Employer* recovers the costs incurred, in the use of the above *Employer's* facilities, from the *Contractor*.

2.3.6 Hazardous Substances

- The *Contractor* shall manage hazardous substances in accordance with the requirements of Occupational Health and Safety Act no 85 of 1993 and NEMWA Act. The *Contractor* shall declare all hazardous chemical substances brought to site to the *Employer*.

2.3.7 Plant Safety Regulations

- The *Employer*, on request from the *Contractor*, isolates required plant from all sources of danger as described in the Plant Safety Regulations.

The *Employer*, on request, makes available a copy of the latest revision of the Plant Safety Regulations available to the *Contractor*.

The *Contractor* complies with all rules and regulations applicable to plant safety and completes the Workman's Register prior to working on the plant.

The *Contractor* declares any grinding and welding to be carried out on the workers register.

At every permit change the *Contractor* withdraws himself/herself/his staff for that period of permit suspension/revocation and thereafter only proceeds with the works after signing onto the new permit.

The *Contractor* ensures that he/she/all sub-*Contractors*/personnel/staff/his visitors are medically, physically and psychologically fit to enter the Kriel Power Station, and specifically any confined space.

The *Contractor* is prohibited from entering Radiation Areas.

The responsibility is on the *Contractor* to ensure that the correct confined space requirements and tests have been done/met by the *Employer* prior to entry into any confined space or hazardous plant areas.

The *Contractor* ensures that all personnel are competent to carry out the works.

The *Contractor* shall provide proof of competency for technical and safety aspects and must be available as and when required on site.

2.4 Environmental Constraints and Management

- All service providers appointed to render any services within Eskom Kriel Power Station are required to comply with the station's Environmental Management System requirements.
- NB: Before commencing with any work, the service providers are required to visit the station's environmental section for evaluation. The station's environmental practitioner will evaluate the services to be rendered by the service provider and therefore allocate relevant legal and other requirements documents which the *Contractor* shall comply with during the works.
- Provide Environmental policy and EMP (Environmental Management Plan)

It should always be noted that Kriel Power Station is ISO14001 certified and therefore promotes Integrated Environmental Management (IEM) philosophy which aims to achieve a desirable balance between conservation and development. All activities taking place within Kriel Power Station must consider section 28 of the National Environmental Management Act (107 of 1998) which makes provision for the duty of care approach. The contractor's team must commit to review and to continually improve environmental management, with the objective of improving overall environmental performance. The *Contractor* must consult with Kriel Environmental section on a regular basis for on-going assistance and advices.

Environmental requirements

The *Contractor* ensures that all goods, services or works supplied in terms of the Contract conform to all applicable environmental legislation. Kriel Environmental Policy must be adhered to as a minimum.

Refuse disposal

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 NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT, 2008

The removal of any hazardous waste is the responsibility of the *Contractor*.

The *Contractor* shall comply with the environmental criteria and constraints as per the Eskom Rules and Regulations.

The service provider shall comply to, but not limited to, all relevant legal and other requirements including the Kriel Power Station EMS, National Environmental Management Act (Act 107 of 1998) as amended and ISO 14001.

2.5 Quality Assurance Requirements

Quality Management System

The *Contractor* shall be required to demonstrate by means of a Contract Quality Plan (CQP) that this organisation is so structured that all the requirements of the specification will be properly monitored and controlled. The Contract Quality Plan (CQP), which must include the Quality Control Plan (QCP), is to be drafted in accordance with QM-58 and the Supplier Contract Quality Requirement Specification (QM58). The Quality documents are to be submitted for approval to the *Quality Engineer* within thirty (30) days after a contract has been awarded to the Contractor.

No work may commence unless the Contract Quality Plan and Quality Control Plan documents have been approved in writing and a copy submitted to the *Quality Engineer/ Employer*. The *Contractor*, in conjunction with the *Quality Engineer* must sign off all Quality Control documents after completing all work as per the

agreed scope. The *Contractor* to submit a copy of the final signed off documents/data packages to the *Employer* within one (1) week after completion of work.

The *Contractor* shall be required to read and fully understand the contents of the Supplier Contract Quality Requirement Specification (QM58) and a copy is to be kept in possession or on premises.

The Supplier Contract Quality Requirement Specification (QM58) shall remain applicable in the event of the contract being extended or modified for reasons permitted.

By signature and acceptance of this contract the *Contractor* acknowledges and agrees to comply with and adhere to Eskom's policies and procedures (current and/or latest revisions) including the Supplier Contract Quality Requirement Specification (QM58).

Contract Quality Management Plan Requirement

The *Contractor* prepares a contract quality management plan that, where appropriate, indicates the following:

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

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

Quality Control Plan

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

The quality control plan indicates the following as appropriate:

- The identification of the item.
- A list of the sequence of operations including inspections and tests.
- The identification of the specification, drawings or procedures for each operation.
- The acceptance criteria with reference to the appropriate technical specification, in-house, national or international standard and relevant clause number.
- The inspections and tests the *Contractor* has nominated for hold and witness points.
- Provision for inspections and tests nominated by the *Quality Engineer*.
- Provision for inspection status indication.
- Inspection and test records which are generated by the *Contractor*.
- Competence of the people-Level II welding inspector, Coded welders, minimum N3 Fitters/Boiler makers
- Personnel qualifications from approved training and accredited institute
- ITPs and welding procedures
- Material certificates
- Organogram indicating the quality person and his/her duties
- Adhere to the QM58
- Follow the Eskom welding rule book

The quality control plans are reviewed by the *Quality Engineer and Employer* to allow for insertion of his specific requirements, including hold and witness points, prior to commencement of work. The *Contractor* does not commence work until the *Employer* accepts.

2.6 Programming Constraints

The Contractor shall submit the first programme to the Project Manager for acceptance within the period stated in the Contract Data. The program must be updated as per the intervals prescribed in the Contract Data. The programme shall be submitted in MS Project Format.

The Accepted Programme at the Contract Date serves as a baseline for the execution of the works until the latter of the defects date or the end of the defects correction period. This baseline shown on all subsequent graphical presentations of revised programmes.

2.7 Contractor's management, supervision and key people

The Contractor must have people that are competent to work in a switchgear rooms, substations and battery rooms with the correct PPE.

2.8 Invoicing and payment

Within one week of receiving a payment certificate from the *Employer* 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 *Employer'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 *Employer*;
- 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)

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

The *Contractor* shall address his invoice to the following email address:

Eskom Development Foundation: invoiceseskomlocal@eskom.co.za

2.9 Insurance provided by the Employer

Refer to section 8 clause 84.

2.10 Contract change management

The *Contractor* and *Employer* shall use the standard NEC forms for any form of communication.

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 *Employer* 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

In order to substantiate the Defined Cost of Compensation Events, the *Employer* may require the *Contractor* to keep records of amounts paid by him for people employed by the *Contractor*, Plant and Materials, work subcontracted by the *Contractor* and Equipment.

2.13 Training workshops and technology transfer

2.13.1 Training

2.13.1.1 GENERAL REQUIREMENTS

- 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*.

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

Training is focused on the specific FDS architecture, configuration, layout, equipment, software and design that the *Contractor* provides for the *works*.

Generalised training based on the *Contractor's* generic FDS architecture and design philosophies is not acceptable.

Training facilities are provided by the *Employer* and/ training will be provided on Kriel site

Training material and tools are not shared by trainees during the training.

- The training provided by the *Contractor* must include all required engineering tools and workstations.

The training is provided as per the detailed training programme and prospectus accepted by the *Employer*

The Kriel specific engineering training, basic & advanced maintenance and operator training is completed after the FAT completion and before commissioning of the system. On delivery of equipment to site a SAT will be conducted to ensure all equipment are as per factory acceptance.

The training schedule is incorporated in the Accepted Programme.

2.13.1.2 TRAINING CATEGORIES

- Practical hands-on training for each individual trainee forms an integral part of each of the courses in these categories:
 - I. Training of Maintenance and Engineering Staff
 - II. Training of Operators

2.13.1.3 TRAINING FOR ENGINEERING AND MAINTENANCE STAFF

Training includes, as a minimum:

- i. Configuration of the system.
- ii. Implemented philosophy.

- iii. Diagnostic tool interpretation and Usage.
- iv. Network and IT configuration.
- v. Capabilities of the new system

2.13.1.4 TRAINING FOR OPERATOR

- Training includes, as a minimum:
 - i. Functionality of the system.
 - ii. Diagnostic tools features.

2.13.1.5 TRAINEE PARTICIPANTS

- The total number of days for training is as follows:

I. Basic / Advanced maintenance	:	2
II. Operators	:	3
III. Engineering	:	2

2.13.1.6 TRAINING DOCUMENTATION

- The *Contractor* provides all course material including manuals.
- The course material is in English and includes all third party documentation.
- Printed and electronic copies of the training documentation are supplied for each trainee plus an additional 3 hardcopy master sets and three electronic copies.
- All training documentation provided by the *Contractor* is customised for Kriel Power Station.
- The training documentation contains the specific FDS system architecture, configuration, layout, software, equipment and Kriel specific design capabilities provided by the *Contractor* as part of the works.
- Training manuals are continuously updated by the *Contractor* up to the date of issue of the Defects Certificate for the whole of the works.

3 Engineering and the *Contractor's* design

The scope of work includes the following:

- (1) Software engineering Design for fire detection system, planning, drawings, spec. etc. for acceptance by Client.
- (2) FAT
- (3) Installation of Siemens Sigmasys-Sinteso FDS hardware (Field components, Control panels, modules, etc.) including all wiring terminations.
- (4) Upload of software.
- (5) Site acceptance testing
- (6) Interfacing of the new installation onto the existing FDS and establishment of communication to the management PC
- (7) Commissioning of the FDS
- (8) Supply of labels for all new equipment and cables installed
- (9) Training of operating, maintenance and engineering personnel
- (10) Supply of documentation (drawings, cable and instrument schedules, training manuals, maintenance manuals, and operating manuals) for all equipment installed.

3.1 Employer's design

3.1.1 The Employer will provide the following as part of the works:

- All areas for the new installations.
- The HVAC system for the equipment rooms
- The station earth point
- Non-redundant 220V power supply from the 220V main distribution board in the existing Unit Equipment room (prior to breaker open)
- 240-56355754 - Field Instrument Installation Standard

3.1.2 The *Contractor* shall provide the following:

- Cubicles in which the old FDS modules are installed and the new modules will be installed
- New field and interface cables must be pulled, utilised and connected between the existing and newly installed FDS.
- The management PC is installed at EOD (existing monitoring system)

3.1.3 Plant Outages

- The *Contractor* ensures that all preparatory work shall be carried out prior to the implementation of the project.
- All outages regarding power down/up shall be co-ordinated with the *Employer*.
- Any work carried out on a running plant (Control rooms, switchgears, etc.) should not jeopardise the availability of the plant during that time.
- A thorough risk assessment on all activities, in as far as potential impact on plant availability should be performed and documented for acceptance by the *Employer* prior to the start of the work.

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

3.2.1 General

The *Contractor's* scope of the *works* is specified below and is presented in detail in this section.

- The *Contractor* Designs, Engineers, Installs and Commissions the extension of the existing FDS at Kriel Power Station. The scope of the *works* include:
 - i. Engineering, design, procurement, manufacturing, factory acceptance testing, delivery and off-loading at site, site acceptance testing, storage, installation, testing, commissioning, optimisation and as-built documentation for Kriel Power Station.
 - ii. Interface of the newly installed FDS to the existing FDS and the interfacing to the management PC.

- (1) The *Contractor* performs the works for the following plant areas Battery rooms, CW pump houses, Auxiliary plant switchgear rooms, Outside plant control room, outside plant workshops including Rotek building, conveyor boards substations, ash handling system and Water treatment plant auxiliaries.

3.2.2 Software Engineering

- The *Contractor* performs the software engineering for the new FDS.
- The *Contractor* must ensure that the new code can communicate with the existing management PC.

3.2.3 FDS Hardware

- The *Contractor* is to supply install and commission all Siemens Sigmasys-Sinteso FDS hardware, this includes power supply, CPU, I/O Modules and interface modules as well as all necessary connectors and accessories for FDS.

3.2.4 Cabling

- New cables will be used where necessary for both powering and signalling.
- New network cables are to be installed.
- The *Contractor* is responsible for the termination of the cables to the new hardware

3.2.5 Engineering Station

- The existing management PC at EOD to be used

3.2.6 Plant Outages

- The *Contractor* ensures that all preparatory work shall be carried out prior to the implementation of the project on the running plant to minimise the downtime.
- All outages regarding power down/up shall be co-ordinated with the *Employer*
- Any work carried out on a running plant should not jeopardise the availability of the plant during that time.
- A thorough risk assessment on all activities, in as far as potential impact on plant availability should be performed and documented for acceptance by the *Employer*, prior to the start of the work.

3.3 Procedure for submission and acceptance of Contractor's design

The Contractor's design is to be submitted to the Employer for acceptance.

The Contractor is only allowed to start procurement after written approval has been received from the Employer.

The acceptance of the design by Employer does not make him/her accountable for the design by the Contractor.

3.4 Other Requirements of the Contractor's Design

3.4.1 Licensing

- All licenses required by the *Employer* covering the equipment, standard software and application software are included as part of the *works*.
- All licenses remain valid in the event of the failure and replacement of faulty equipment
- All licenses required by the *Employer* are valid for the entire life of the FDS.
- All licenses are site licenses for use at Kriel Power Station Site.

Installation disks are provided for all licensed software provided.

3.4.2 Upgrades

- Upgrades of software and the associated licenses are provided throughout the duration of the *works*.
- All necessary software patches, bug fixes, and software upgrades required for the systems are provided throughout the duration of the *works*.

3.4.3 Plant Codification

- (1) Plant codification is done according to the AKZ system as used at Kriel Power Station.
- (2) The *Contractor* is to supply a detailed list of instrumentation and equipment to be installed, as well as the cable schedule, no less than 3 (three) weeks before installation on site commences. The Employer will generate suitable codification and descriptions for new equipment, cables and signals. The codes and descriptions will be supplied to the *Contractor*.
- (3) References to plant are accompanied by the relevant AKZ code for that item of plant.
- (4) The *Contractor* ensures that all plant, materials, components and documentation as part of the works is codified correctly.

3.4.4 Plant Labelling

- (1) Labelling of all equipment and documentation supplied is part of the *works* and is the responsibility of the *Contractor*. The relevant AKZ code is included on the label according to the required format, together with plant description.
- (2) All the labelling and inscriptions will be to the Kriel Technical Specification for AKZ Labels.
- (3) A prototype will be submitted for acceptance to the *Employer* prior to fixing the labels on the plant. Equipment labelling should not interfere with maintenance and commissioning activities, if not possible the label should be fitted such that it could be removed and replaced without damage to the label.
- (4) All cable labelling to be approved by the *Employer*.
- (5) Labels shall be produced and attached to relevant equipment and cables no longer than 3 (three) weeks after work on site have been completed.

3.5 Use of Contractor's design

- The *Employer* can use the *Contractors* design of the *works* at any given point in time, its information, design, for the purpose of construction and modification throughout the life of the plant.

3.6 Design of Equipment

3.6.1 Removal of Existing Equipment

- i. N/A.

3.6.2 Packaging

- All the identified equipment that will be re-used must be packaged such that it can be easily transported without being damaged.

The equipment that needs to be packaged is clearly marked by the *Contractor* before decommissioning starts.

Equipment not marked for re-use is removed and transported to the dedicated disposal areas.

3.6.3 Storing of Equipment

- A dedicated equipment storage area shall be provided by the *Employer* and be regarded as the site establishment for the *Contractor* to use while executing the works.

All storage areas are located within the boundaries of Kriel Power Station.

The *Contractor* maintains a detailed inventory of all equipment that has been removed from the plant, and stored in the temporary and permanent storage areas.

For the duration of the *works*, the *Contractor* updates the inventory as and when equipment is removed or added to the storage areas.

3.6.4 Transporting

- The *Contractor* is required to transport all the equipment to the temporary storage or to the disposal area.

The *Contractor* is also required upon completion of packaging to transport the equipment to the permanent storage area.

3.7 Equipment required to be included in the works

- The *Contractor* provides all the tools and equipment necessary to perform the works stipulated in this works information.

3.8 As built drawings, operating manuals and maintenance schedules

- As built drawings to be supplied in as a hard copy as well as soft copy (Cad file type (*.DGN) or AutoCad (*.dwg or *.dxf)
- Operating and maintenance manuals in hard copies (2 copies) and soft copies in PDF format.

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 *Employer* 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

See section 2.5 of works information

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

The employer provides the original field design for the areas as indicated to be covered by the new FDS installation.

4.3.3 *Contractor's* procurement of Plant and Materials

Specify any constraints on how the *Contractor* is to order, codify, expedite, freight, import, transport to Site and any other requirements for delivery and storage before installation. The *Employer* may require warranties from suppliers to be in favour of the *Employer* and not just to the *Contractor* during the life of the contract. Also include requirements for vendor data which the *Employer* may need after Completion of the whole of the works. THIS IS A VERY IMPORTANT SECTION IN PROCESS PLANT AND UTILITY PROCUREMENT CONTRACTS.

4.3.4 Spares and consumables

4.3.4.1 Spares List and Maintenance Requirements

- (1) The *Contractor* is to supply a list of all spares that will be required to maintain the plant in the future as well as the number of spares to be kept on site.
- (2) The *Contractor* will also specify the maintenance requirements for each installed component, stipulating the frequency of maintenance, action to be carried out, tools required and risks involved.
- (3) The spares list must be submitted to the Employer as soon the *Contractor* has placed orders for all the equipment.

4.4 Tests and inspections before delivery

FAT to be conducted at the premises of the Contractor to ensure that the Employer and End Users are satisfied with the System to be installed. This must be done prior delivery to site.

4.5 Site Acceptance Testing

- (1) Site Acceptance Testing is performed once the Project Manager has certified Commissioning as complete.
 - (2) Site Acceptance Testing commences when the system is in operation.
 - (3) The *Project Manager* makes final arrangements with the *Contractor* 72 hours in advance for Site Acceptance Testing.
 - (4) Site Acceptance Testing includes verification of functionality and performance of the system according to the requirements for the provision of the works.
 - (5) Operational testing commences once the *Project Manager* has certified Site Acceptance Testing as complete.
 - (6) As a minimum, the SAT's are used to certify the following:
 - i. Installation to comply with accepted drawings unless changes accepted in writing by the Employer
 - ii. Quality of installation as certified by non-destructive testing to be performed by the Contractor
 - (7) The Site Acceptance Test will include a test run of 72 hours where no system faults occur.
- Site Acceptance testing commences Installation and Commissioning as complete as per QCP.

4.6 Marking Plant and Materials outside the Working Areas

N/A.

4.7 Contractor's Equipment (including temporary works)

4.7.1 Contractor's yard, offices, workshops and stores

- (1) It is required, for the proper co-ordination and execution of the *works* that the *Contractor* has an office on Site for the duration of the contract.
- (2) The *Contractor* includes in his establishment rates for all further treatment of the yard areas that he considers necessary for his entire operation throughout his period of occupation and under all weather conditions. The *Contractor* also includes for all security fencing, security and access

arrangements. Maintenance of the yard is the *Contractors* responsibility and to the *Employers* acceptance.

- (3) Outfall drainage of all surface run-off drains is constructed by the *Contractor* to the acceptance of the *Employer* to minimise erosion and to effect control of contaminated water. The *Contractor's* plan for the layout of his yard area are accepted by the *Employer* prior to occupying the yard and the *Contractor* does not occupy any site area other than that allocated to him. The *Contractor's* plan states fully what measures are taken regarding removal and storage of topsoil, stabilisation of eroded areas and further loss of topsoil.
- (4) The *Contractor* complies with the environmental policy given in the Site Regulations. The *Contractor* provides, erects and maintains for his own use adequate size office accommodation and stores together with such drainage, lighting, heating, and hot and cold water services as may be required. Provision is also made for adequate parking and a turning area adjacent to all the aforesaid structures. The *Supervisor* prior to commencement of any work on Site accepts all designs and layouts for these provisions.
- (5) The *Contractor* dismantles and clears the yard of all such temporary structures and associated foundations and infrastructure at the direction of the *Supervisor* on Completion of the whole of the works. No such dismantling and clearance work is carried out without prior acceptance from the *Supervisor*.

4.7.2 Telecommunications

- (1) Neither a network point nor a telephone is available on site. Should the *Contractor* require one, he is to make his own arrangements with relevant authorities. Arrangements may also be made to use the telephones of the station if they are available. Calls from these will be charged for at prevailing GPO rates.
- (2) Should the *Contractor* wish to use radio communication equipment on site, he will make his own arrangements with the relevant authorities. In this case, he is requested to liaise with the head of security at the station to ensure that there is no interference with existing channels or equipment.

4.7.3 Equipment/appliances

- (1) Any electrical Equipment, or appliances, used by the *Contractor* conforms to the applicable OHS Act safety standards and is maintained in a safe and proper working condition. The *Employer* has the right to stop the *Contractor's* use of any electrical Equipment, or appliance, which, in the opinion of *Employer*, does not conform to the foregoing.
- (2) The *Contractor* will be responsible for the off-loading of equipment, plant and material but the responsibility for off-loading remains with the *Contractor*.
- (3) Any special tools and equipment to be used on site for the execution of the works is the responsibility of the *Contractor*.
- (4) Should a crane be required for the execution of the Works, it will be supplied by Eskom, only if it is available; otherwise the contractor will have to arrange his own crane.
- (5) Arrangements for such a crane must be made in advance at least two weeks prior to the required date. No extension of time and/or claim for standing time will be granted should the *Contractor* not conform to this specification.

4.8 Cataloguing requirements by the Contractor

All newly installed equipment must be catalogued. The Contractor shall supply all technical information required for cataloguing an item.

5 Construction

5.1 Temporary works, Site services & construction constraints

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

Kriel Power Station is a national key point with very strict entrance requirements that must always be complied with.

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

The *Contractor* shall comply to the restrictions as per site rules relating to roads, walkways and barricades. There are areas marked as red zones at which the *Contractor* should comply.

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

The *Contractor* shall comply to the working hours at Kriel power station which are from: 7:00 till 16:15 from Monday to Thursday and 7:00 to 12:00 on a Friday. The contractor to cater for weekends due to access restrictions in certain areas or due to outages that may fall over the weekend.

It is very important that the *Contractor* keeps records of his people on Site, including those of his Subcontractors which the *Employer* or *Supervisor* have access to at any time. These records may be needed when assessing compensation events.

5.1.4 Health and safety facilities on Site

On requiring medical attention, the *Contractor* must notify the *Employer* and be taken to the medical centre to be evaluated further and administered First Aid if necessary. Any emergency experienced by the *Contractor* must be reported to the *Employer* promptly.

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

Refer to paragraph 2.4 above.

5.1.6 Title to materials from demolition and excavation

The *Contractor* has no title to materials from excavation and demolition. All reusable equipment will remain the property of the *Employer*. All identified scrap material to be scrapped daily and disposed at the *Employer's* scrap yard.

5.1.7 Cooperating with and obtaining acceptance of Others

The *Contractor* shall interface with others during execution, proper planning and communication should be effected to ensure smooth running of the project. In cases where there is an outage, the activities shall be interfaced with others by arranging planning meetings.

5.1.8 Publicity and progress photographs

Kriel Power Station is a national key point and taking of photos is not allowed onsite. Should there be a need to take pictures/photos on site permission should be requested in writing from the head of security.

5.1.9 Contractor's Equipment

Contractor's Equipment shall comply as prescribed on the SHE Specification. The *Contractor* shall provide all necessary equipment to execute the works i.e. lifting equipment, rigs and cranes.

5.1.10 Equipment provided by the *Employer*

The *Employer* will not provide any equipment, The *Contractor* shall ensure all equipment as per the scope of work is catered for. This will include scaffolding.

5.1.11 Site services and facilities

Employer will provide power, water, waste disposal, ablutions, fire protection, lighting etc. The *Contractor* shall provide everything else necessary for Providing the Works. Upon approval of safety file a site will be allocated to the *Contractor* for establishment.

5.1.12 Facilities provided by the *Contractor*

Electrical equipment/appliances, lighting and power

Any electrical equipment or appliances used by the *Contractor* must comply with all relevant safety regulations and requirements as detailed in Eskom Procedures and be maintained in safe and proper working condition.

The *Supervisor* has the right to stop the *Contractor's* use of any electrical equipment or appliance which, in the *Supervisor's* opinion, does not conform to the foregoing.

The *Contractor* provides at his own expense any temporary local lighting, and ensures that it is in accordance with the requirements of the Factories Inspector.

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

Security

The *Contractor* is responsible for all security on site, viz., fencing of, night watch and access control in order to secure all plant, materials and the works itself. All these measures must be in accordance with any relevant regulations and standards and are subject to the *Supervisor's* acceptance.

It is also the *Contractor's* responsibility to ensure the security of all completed portions of the works prior to Completion.

Accommodation of employees

The *Contractor* is responsible for the provision of accommodation or meals of his own personnel, and the cost thereof to be included in his Price.

Sanitary facilities

The *Contractor* provides services, maintains and removes on Completion any facilities required and allow for same in his Price.

Housekeeping

The *Contractor's* equipment does not impair the operation of the surrounding plant or access to the surrounding plant.

Plant and materials

The *Contractor* is to recommend the keeping of any additional stocks of spare parts based on experience gained by him during the execution of the works.

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

Employer to arrange meeting with contractor and all stakeholders especially operating to ensure efficient planning of the work including permit arrangements for switchgear and battery rooms

5.1.14 Survey control and setting out works

Risk assessments must be conducted in each area before performing the installation.

5.1.15 Excavations and associated water control

Not applicable.

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

The Contractor shall ensure that they detect underground cabling if necessary prior installing new cabling.

5.1.17 Control of noise, dust, water and waste

The Contractor shall comply with OHS Act for health and safety of the plant and personnel

5.1.18 Sequences of Construction or Installation

Not necessary for the works.

5.1.19 Giving notice of work to be covered up

The Contractor shall report any day to day issues to the Supervisor when matters arise. The Supervisor shall be given an opportunity to resolve the issue before it is escalated to the Employer.

5.1.20 Hook ups to existing works

Not applicable.

5.2 Completion, testing, commissioning and correction of Defects

5.2.1 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 Employer 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
As built drawings of all areas as indicated in the scope of work	Within 14 days after Completion

5.2.2 Use of the works before Completion has been certified

Clause 35.2 in ECC3 provides that the Employer may use any part of the works before Completion has been certified but if he does so he takes over the part of the works except if the use is for a reason stated in the Works Information.

5.2.3 Materials facilities and samples for tests and inspections

All equipment to be installed with data sheets to be inspected to justify their relevance to the application it is required for.

5.2.4 Commissioning

Commissioning shall be conducted on completion of each section. Commissioning will be performed according to the Low Voltage Switchgear and Control Gear Assemblies and Associated Equipment for Voltage up to and including 1000V AC and 1500V DC Standard 240-56227516.

- (1) The *Project Manager* will make final arrangements with the *Contractor* during progress meetings as per the schedule indicated on the program, with preliminary arrangements made in advance.
- (2) Before equipment is placed in service the *Contractor* certifies that it is in a suitable and safe condition.
- (3) Commissioning checks include verification of connections, configuration, integration, interfacing, and functionality.
- (4) Prior to the time when commissioning checks are to commence, the Basic Engineer will co-ordinate the commissioning of all equipment forming an integral part of the plant being commissioned.
- (5) In those 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 system. In the event of incorrect functioning, the *Contractor* determines the cause and corrects the fault. If the trouble is within equipment supplied to the *Contractor*, the *Project Manager* is to rectify defects within the *Employer's* equipment.

5.2.4.1 COLD COMMISSIONING

- As a minimum, the cold commissioning activities conducted by the *Contractor* consists of:
 - i. Instrumentation loop checks.
 - ii. Interface checks.
 - iii. Testing of system functionality.
 - iv. Integrity Checks.
- The Integrity checks are function checked by simulation at the field equipment device. The *Contractor* provides a printed log to confirm signals and integrity. All checks are verified on the local mimic, local engineering station and the main control display.

5.2.4.2 HOT COMMISSIONING

- The *Contractor* submits the Cold Commissioning test results to the *Project Manager*.
- The *Contractor* requests the commencement of hot commissioning upon acceptance of cold commissioning results.
- Hot commissioning is where the plant processes are placed into operation in conjunction with the FDS.
- The *Contractor* is responsible for the commissioning of the complete FDS for each of the plant areas.
- The commissioning activities are carried out in conjunction with the *Project Manager*.
- The *Employer* is responsible for the preparation of the plant for hot commissioning.
- Commissioning is at the discretion of the *Project Manager* for equipment which cannot be commissioned separately.
- In cases where various components (existing or new) 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.
- If a defect is identified in the equipment interfacing to, or external to the *Contractor's* scope the *Contractor* informs the *Project Manager* or Representatives immediately.

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

Not applicable for the works.

5.2.6 Take over procedures

Not applicable as this is an expansion of an existing system.

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

The Employer shall provide access to the Contractor for corrections of defects

5.2.8 Performance tests after Completion

N/A

5.2.9 Training and technology transfer

See section 2.13.1

5.2.10 Operational maintenance after Completion

The contractor must be available after completion of the works to assist the Employer with any operational issues that are experienced.

6 Plant and Materials standards and workmanship

6.1 Investigation, survey and Site clearance

Not applicable.

6.2 Building works

Not applicable.

6.3 Civil engineering and structural works

Not applicable.

6.4 Electrical & mechanical engineering works

A Power supply of 220V is required in each battery room for the Sirens and strobe lights that is required in these areas.

- The 220V AC power supply will be provided for from the 380V Essential Board A, 220V spare circuits at every unit.
- The Contractor shall provide, install, terminate, test and connect the cabling from the essential boards to the small DB for the supply to the FDS.
- The small DB will also be designed (aligned with power requirements specified in the contractors detailed design), manufactured and tested, provided and installed by the contractor.
- The cabling from the small DB to supply all FDS equipment will be provided, installed, terminated, tested and connected by the contractors.
- As built drawings for new installation interfacing with the existing installation will be required.

The standard to be complied is

- SANS 10142
- Drawings standard 240-86973501
- LV Power and Control Cables 240-56063805
- Earthing and Lightning Protection Standard 240-56356396
- MV and LV Protection Standard 240-56357424

6.5 *Process control and IT works*

Not applicable.

6.6 *Other [as required]*

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
0.45/52296		Unit 1 Battery Room
0.45/54913		Unit 2 Battery Room
0.45/54914		Unit 3 Battery Room
0.45/54911		Unit 4 Battery Room
0.45/54912		Unit 5 Battery Room
0.45/54915		Unit 6 Battery Room
0.45/60910		Admin LTG Switchgear room
28.45/60923		ASH Handling Compressor House Substation
0.45/24450		Ash Conveyor Substation
0.45/6616		Ash Water Return PMP House
0.45/60913		Ash Water Supply PMP House
0.45/3446		Substation 1&2/ Coal Plant NORTH Substation
0.45/24454	2	Substation 3&4/ Coal Plant SOUTH Substation
0.45/30681	1	Conveyor Board 1 Substation
0.45/24451	0	Conveyor Board 2 Substation
0.45/24450	1	Conveyor Board 3 Substation
0.45/60911		Conveyor Board 4 Substation
0.45/24448	1	Conveyor Board 5 Substation
0.45/24443	0	Conveyor Board 6 Substation
0.45/24453	0	Conveyor Board 7 Substation
0.45/24452	0	Conveyor Board 8 Substation
0.45/7491		Distribution Board Switchgear room
0.45/30682	0	CW PMP HOUSE NORTH
0.45/24445	0	CW PMP HOUSE SOUTH

0.45/60912		DEMIN & CP PLT BRD 1&2 Switchgear room
0.45/60914		MAIN SILO BRDs Switchgear room
0.45/30683	1	MAIN WORKSHOP Switchgear room
0.45/60915		MATLA POTABLE WTR PMPS Switchgear room
0.45/60916		PLATTER & WELDER SHOP
0.45/54864		Raw water & USUTU MATLA PMP HSE Switchgear room
0.45/15869		ROTEK WORKSHOP
0.45/60917		SEWAGE PLT Switchgear room
0.45/11871		HP DEMIN & Water PLNT BRDs Switchgear room
0.45/60918		TRFR OIL FILTRATION PLT
0.45/872	0	KWANALA BOARDS Switchgear room
0.45/60919		Turbine Oil PMP HSE
0.45/60194		Station Main Silo Control Room
0.45/51944	0	Station Cleaning Building (Outside Plant Control Room)
0.45/		Soweto Building and Park homes

8 Specifications

Title	Tick if publicly available
[2] ISO/IEC 24764 / EN50173-5: Generic cabling systems for data centres	x
[3] EN50173-1: Information technology. Generic cabling systems. General requirements	x
[4] EN50173-5: Information technology - Generic cabling systems - Part 5: Data centres	x
[5] EN50174-1: Information technology. Cabling installation.	x
[6] EN60793-2: Optical fibres sectional specification	x
[7] IEC 62381 Factory acceptance test (FAT), site acceptance test (SAT), and site integration test (SIT)	x
[8] IEC 62382 Loop checks	x
[9] IEC 61355 Engineering documentation classification and numbering	x
[10] IEC 61238-1 Cabling	x
[11] SANS 10142-1 Cabling Certificate of Compliance	x
[12] SANS 1574	x
[13] SANS 1411 (parts 1-7)	x
[14] SANS 60794-1-1	x
[15] ISO 898-1	x
[16] ISO 898-5	x
[17] IEC 62079	x
[18] Basic Configuration Management Requirements	x
[19] Human Machine Interface Design Standard	x
[20] Field Instrumentation Installation Standard: Junction Boxes and Cable Termination – 240-56355815	
[21] Field Instrument Installation Standard - 240-56355754	
[23] Earthing and Lightning Protection Standard - 240-56356396	
[25] Requirements for Control and Power Cables for Power Stations Standard - 240-56227443	

[27] SANS10139 - Fire Detection and Alarm Systems for Buildings System Design Installation and Servicing	x
Low Voltage Switchgear and Control Gear Assemblies and Associated Equipment for Voltage up to and including 1000V AC and 1500V DC Standard - 240-56227516	

C3.2 CONTRACTOR'S WORKS INFORMATION

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

Typical sub headings could be

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

This section could also be compiled as a separate file.
