

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS**PART 3: SCOPE OF WORK**

Document reference	Title	No of pages
	This cover page	1
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COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

C3.1: EMPLOYER'S WORKS INFORMATION

Contents

Part 3: Scope of Work	1
C3.1: Employer's works Information	2
1 Description of the works	4
1.1 Executive overview	4
1.2 Employer's objectives and purpose of the works	4
1.3 Interpretation and terminology	4
1.4 Detailed Scope of Work	5
1.4.1 Plant Description	5
1.4.2 Work To Be Performed by Contractor	8
1.4.3 CONSTRAINTS ON HOW THE CONTRACTOR PROVIDES THE GOODS.....	9
2 Management and start up.	9
2.1 Management meetings	9
2.2 Documentation control	9
2.3 Health and safety risk management	9
2.3.1 Safety of Worker	10
2.3.2 Fire Protection	10
2.3.3 First aid	11
2.3.4 Housekeeping	11
2.3.5 Barricading	11
2.3.6 Radiographic Examinations	11
2.3.7 Permit to Work System	11
2.4 Environmental constraints and management	11
a) The <i>Contractor</i> and or supplier shall allocate funds for the implementation of environmental requirements.....	12
b) All contractors shall abide to Eskom Zero Liquid Effluent Discharge through the process of reuse and recycling.....	12
c) All waste generated during the execution of the scope of work shall be managed in accordance with Kusile Power Station Waste Management Work Instruction (240-105776552) and in compliance with applicable environmental legislation and bylaws.....	12
d) All contractors should be aware of Eskom SHEQ Policy.....	12
e) All contractors must consider environmental consideration when carrying out Risk Assessments.	12
f) All equipment used on site must be in good working condition and no fuel and/or oil leaks on any plant will be tolerated.....	12
2.5 Quality assurance requirements	13
2.5.1 Quality Management.....	13

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

2.5.2	Quality Responsibility.....	14
2.5.3	Non-Conformances and Defects.....	14
2.6	Programming constraints.....	15
2.6.1	Inclusions in the programme.....	15
2.6.2	Computerised Planning and Reporting.....	15
2.6.3	Project Calendar	15
2.6.4	Additional Programme Requirements.....	15
2.6.5	Submission of Revised Programmes.....	16
2.6.6	Bi-Weekly Progress reporting	16
2.7	<i>Contractor's</i> management, supervision and key people	16
2.8	Invoicing and payment.....	16
2.9	Contract change management	17
3	Engineering and the <i>Contractor's</i> design	17
3.1	<i>Employer's</i> design	17
3.2	As-built drawings, operating manuals and maintenance schedules	17
4	Procurement.....	17
4.1	People.....	17
4.1.1	Minimum requirements of people employed on the Site	17
4.2	Subcontracting.....	17
4.2.1	Limitations on subcontracting	17
4.3	Plant and Materials.....	18
4.3.1	Quality.....	18
5	Construction.....	18
5.1	Temporary works, Site services & construction constraints.....	18
5.1.1	<i>Employer's</i> Site entry and security control, permits, and Site regulations.....	18
5.1.2	Restrictions to access on Site, roads, walkways and barricades.....	18
5.1.3	People restrictions on Site; hours of work, conduct and records.....	18
5.2	Completion, testing, commissioning and correction of Defects.....	19
5.2.3	Commissioning	19
5.2.4	Take over procedures	20
5.2.5	Access given by the <i>Employer</i> for correction of Defects	20
6	List of drawings.....	21
6.1	Drawings issued by the <i>Employer</i>	21

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

1 Description of the works

1.1 Executive overview

In electrical engineering, effective earthing is critical to ensure safety, minimize equipment damage, and maintain system reliability. Traditionally, copper has been the preferred material for earthing due to its high conductivity, durability, and resistance to corrosion. However, escalating costs, environmental concerns, and the increasing incidence of copper theft have prompted the industry to consider alternative materials and methods for earthing.

The earthing and lightning protection standard applicable to Kusile Power Station, has earthing cabling installed complying to the approved Eskom Standard. The current installed copper earthing is prone to theft, and there had been several theft cases of copper theft reported at Kusile Power Station. This scope of work is for the replacement of the copper earthing with alternative conductors to solve the copper theft problem and to improve Earthing and Lightning Project System reliability.

1.2 Employer's objectives and purpose of the works

The fault level, which is the maximum prospective current that can flow in a system during a fault condition, has a substantial impact on the earthing design. High fault levels require robust earthing systems to safely dissipate large fault currents without causing dangerous touch and step potentials around the installation. For example, in areas with high fault levels, like near generators or transformers, the earthing system needs to incorporate thicker conductors and deeper grounding rods or mats to handle the increased thermal and mechanical stresses.

1.3 Interpretation and terminology

The following abbreviations are used in this Works Information:

Abbreviation	Explanation
AC	Alternating Current
CoC	Certificate of Compliance
C&I	Control and Instrumentation
DC	Direct Current
EMI	Electro-Magnetic Interference
ISO	International Organization for Standards
ITP	Inspection and Test Plan
m	Meters
mm	Mili-meters
N/A	Not Application
OEM	Original Equipment Manufacturer
QC	Quality Checks
QCP	Quality Control Plant

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

1.4 Detailed Scope of Work

1.4.1 Plant Description

Earthing installations in power plants are critical for ensuring safety and reliable operation, as they protect personnel, equipment, and instrumentation from electrical faults. The design and implementation of earthing systems can vary significantly depending on several key factors, including fault levels, soil resistivity, and the specific electrical and control requirements of various plant areas.

1.4.1.1 Fault Level Considerations

The fault level, which is the maximum prospective current that can flow in a system during a fault condition, has a substantial impact on the earthing design. High fault levels require robust earthing systems to safely dissipate large fault currents without causing dangerous touch and step potentials around the installation. For example, in areas with high fault levels, like near generators or transformers, the earthing system needs to incorporate thicker conductors and deeper grounding rods or mats to handle the increased thermal and mechanical stresses.

1.4.1.2 Area-Specific Earthing Requirements

Different plant areas have unique earthing requirements based on their specific functions and the nature of the equipment they house:

- **Power Generation Area:** This area, encompassing generators, transformers, and switchgear, usually requires a highly robust earthing grid because of high fault currents associated with power generation and distribution equipment. In this case, the earthing system often includes multiple interconnected ground rods or mats, creating a low-resistance path to ground and effectively distributing fault current across the grid to prevent localized heating and stress.
- **Process Control and Instrumentation (C&I) Room:** The Control and Instrumentation room, which houses sensitive control equipment, various measurement devices, has stringent earthing needs to protect against both electrical faults and electromagnetic interference (EMI). In the C&I room, the earthing system often incorporates a separate clean earth to provide a stable reference voltage for control signals. This system is carefully designed to avoid ground loops, which could induce noise in control signals and lead to erroneous readings or malfunction.
- **Substations and Switchgear Rooms:** Earthing in substations and switchgear rooms must account for high transient currents and lightning protection. The design often includes surge arrestors and low-resistance grounding mats or grids to divert both fault and lightning currents safely into the earth. The earthing conductors are typically sized to endure high short-circuit currents without degradation.

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

Below is the table showing various conductor sizes per plant area.

REF. CLAUSE	DESCRIPTION OF PLANT	DESCRIPTION OF EARTHING	RATED AREA OF COPPER (mm ²)	NUMBER OF CONNECTIONS	CONDUCTORS PER CONNECTION	ALTERNATIVE CONDUCTOR SIZES (mm)
	Generator and Unit Transformers	- Connection straps - Earth rods	600	2	2	- 50 x 3 mm - 2 x 10 mm ø
	Generator, 22 kV Phase Isolated Busbars (IPB), Earth Switch and Circuit Breaker	- Connecting straps - Earth rods	600	2	2	- 50 x 3 mm - 2 x 10 mm ø
	Generator VT or CT cores, surge arrestors and earthing transformers	- Connection straps - Earth rods	150	1 each	1	- 50 x 3 mm - 2 x 10 mm ø
	Transformers	- Connecting straps - Round earth conductor - Insulated earth conductor	600 70	2	2	- 50 x 3 mm - 2 x 10 mm ø - Cable
	Trefoil cable bonds	- Connecting straps - Earth rods	75	1	1	- 25 x 3 mm - 1 x 10 mm ø
	Lead sheaths of MV cables	- Connection straps - Round earth conductor	75	1	1	- 25 x 3 mm - 1 x 10 mm ø
	Cable Junction Boxes	- Connecting straps - Earth rods	75	1	1	- 25 x 3 mm - 1 x 10 mm ø
	MV switchgear	- Connecting straps - Round earth conductor	600	2	2	- 50 x 3 mm - 2 x 10 mm ø
	690 V & 400 V switchgear (unfused supply)	- Connection straps - Round earth conductor	600	2	2	- 50 x 3 mm - 2 x 10 mm ø
	690 V & 400 V switchgear (fused supply)	- Connection straps - Round earth conductor	150	2	1	- 50 x 3 mm - 1 x 10 mm ø
	Control stations starters etc.	- Connecting straps - Round earth conductor	75	1	1	- 50 x 3 mm - 1 x 10 mm ø

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

REF. CLAUSE	DESCRIPTION OF PLANT	DESCRIPTION OF EARTHING	RATED AREA OF COPPER (mm ²)	NUMBER OF CONNECTIONS	CONDUCTORS PER CONNECTION	ALTERNATIVE CONDUCTOR SIZES (mm)
	MV motors	- Connection straps - Round earth conductor	150	1	1	- 50 x 3 mm - 2 x 10 mm ø
	LV motors: 400 V, 690 V and 220 V DC (above 30 kW)	- Connection straps - Round earth conductor - Insulated earth conductor	75 70 or 16	1	1	- 25 x 3 mm - 1 x 10 mm ø - Cable
	LV motors: 400 V, 690 V and 220 V DC (below 30 kW)	Earth continuity conductor in supply cable	1.5 to 16	1	1	Cable
	Air Cooled Condensers	- Earth mat	- 75	--	--	- 10 mm ø
		- Earth bar	- 150	1	1	- 50 x 3 mm - 2 x 10 mm ø
		- Steelwork/earth mat connection	- 600	2	2	- 50 x 3 mm - 2 x 10 mm ø
	Computer and Computer Room Earthing	Floor grid/earth mat connecting straps	75	1	1	- 25 x 3 mm
	Water treatment plant Workshops and stores	- Earth mat	- 75	--	--	- 10 mm ø
		- Earth bar	- 150	- 1	- 1	- 50 x 3 mm - 2 x 10 mm ø
		- Earth bar/earth mat connection	- 75	- 1 (min)	- 1	- 25 x 3 mm - 1 x 10 mm ø
		- Earth mat	- 75	--	--	- 10 mm ø
		- Earth bar	- 300	- 2	- 2	- 50 x 3 mm - 2 x 10 mm ø
	Fuel oil plant	Earth bar/earth mat connection	150	2 (min)	1	- 25 x 3 mm - 1 x 10 mm ø

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

REF. CLAUSE	DESCRIPTION OF PLANT	DESCRIPTION OF EARTHING	RATED AREA OF COPPER (mm ²)	NUMBER OF CONNECTIONS	CONDUCTORS PER CONNECTION	ALTERNATIVE CONDUCTOR SIZES (mm)
	Boiler and turbine house steelwork	- Earth mat	- 75	--	--	- 10 mm ø
		- Main earth bar	- 300	- 1	- 1	- 50 x 6 mm - 2 x 2 x 10 mm ø
		- Earth bar/earth mat connection	- 120	- Every 2 columns	- 1	- 40 x 3 mm - 1 x 10 mm ø
		- Subsidiary earth bars	- 230	- 2	- 1	- 40 x 3 mm - 1 x 10 mm ø

1.4.2 Work To Be Performed by Contractor

The following are the *Contractor's* requirement:

- Supply and deliver alternative earthing cables, lugs, and clamps.
- Remove all earthing copper strategically to avoid compromising earthing in various areas.
- Replace all removed copper with alternative earthing conductors.
- Verify or re-issue CoC to confirm compliance of new earthing installations.
- Conduct earth test and compare with test done with copper conductors.

The scope of the modification is to replace the current installed copper earthing as listed in table 2 below with recommended alternatives.

Table 1: Scope of alternative earthing with quantities

Installed in the Plant	Alternative replacement earthing cables	Area of alternative earthing cables (mm ²)	Quantity
Insulated copper cable (6mm ²)	Anti-theft Cable (Kwena)	6	500m
Insulated copper cable (16mm ²)	Anti-theft Cable (Kwena)	16	500m
Insulated copper cable (25mm ²)	Anti-theft Cable (Kwena)	25	500m
Insulated copper cable (35mm ²)	Anti-theft Cable (Kwena)	35	500m
Insulated copper cable (70mm ²)	Anti-theft Cable (Kwena)	70	5000m
Copper Lugs (6mm ²)	Copper Tin Plated lugs	6	500 units
Copper Lugs (16mm ²)	Copper Tin Plated lugs	16	500 units
Copper Lugs (25mm ²)	Copper Tin Plated lugs	25	500 units
Copper Lugs (35mm ²)	Copper Tin Plated lugs	35	500 units
Copper Lugs (70mm ²)	Copper Tin Plated lugs	70	800 units
100 x 3 mm copper strip	Aluminium Strip	100X3	500m

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

50 x 6 mm Copper Bar	Aluminium Strip	100X6	500m
Copper C-Clamps	Tin plated C-Clamps	N/A	500 units
10mm diameter black annealed copper	13.5mm Aluminium	N/A	500m

1.4.3 CONSTRAINTS ON HOW THE CONTRACTOR PROVIDES THE GOODS.**1.4.3.1 Quality Assurance Requirements**

- All works to comply to quality standard ISO 9001:2015
- QCP and ITP to be submitted by the service provider for the employer to review, indicate intervention points and approve.

2 Management and start up.**2.1 Management meetings**

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

Title and purpose	Approximate time & interval	Location	Attendance by:
Project Kick-off Meeting	1 x week post Contract Award	Kusile Power Station	Employer, Contractor and Others
Execution Progress Meeting	Bi- Weekly	Kusile Power Station	Employer, Contractor and Others
Risk register and compensation events	Bi- Weekly	Kusile Power Station	Employer, Contractor
Title and purpose	Approximate time & interval	Location	Attendance by:

Meetings of a specialist nature may be convened as specified elsewhere in this Works Information or if not so specified by persons and at times and locations to suit the Parties, the nature and the progress of the works. Records of these meetings shall be submitted to the *Project Manager* by the person convening the meeting within five days of the meeting.

All meetings shall be recorded using minutes or a register prepared and circulated by the person who convened the meeting. Such minutes or register shall not be used for the purpose of confirming actions or instructions under the contract as these shall be done separately by the person identified in the *conditions of contract* to carry out such actions or instructions.

2.2 Documentation control

All contractual communication between the Employer and the Contractor shall be in the form of properly compiled letters or forms attached to e-mails and not as a message in the e-mail itself. All formal communication is via the Project Manager.

2.3 Health and safety risk management

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

The Contractor complies with the Occupational Health and Safety Act Number 85 of 1993 and its regulations, Employer's SHEQ Policy, Standards, Procedures, Guidelines, Specifications and Regulations. The Contractor ensures safety awareness at all times through continuous training.

The Contractor must at all times be responsible for the supervision of his employees, agents and sub-Contractors, and takes full responsibility and accountability in ensuring that they are competent, compliant and aware of the legal requirements and other applicable requirements, and executes the works accordingly.

The Contractor ensures that all statutory appointments, and appointments required by any Employer's Policy, standard and Procedure, are recorded in writing and that all its appointees and/or agents fully understand their responsibilities and are trained and competent to execute their duties.

The Employer's Project Manager, or any person appointed by the Employer's Project Manager, may at any stage during the term of the contract:

Conduct health and safety audits by a competent person regarding all aspects of compliance with the SHEQ requirements, at any off-Site place of work, or the Site establishment of the Contractor.

Refuse any employee, sub-Contractor or agent of the Contractor access to the premises if such person has been found to commit an unsafe act or if any work is found not to be compliant or authorized.

Issue the Contractor with a STOP WORK ORDER should the Employer's Project Manager become aware of any unsafe working procedure or condition, or any non-compliance.

The Contractor immediately reports all incidents as well as any threat to safety and health of which the Contractor becomes aware at the Site, to the Employer's Project Manager.

The Contractor agrees that the Employer is relieved of any and all of its responsibilities and liabilities in terms of the Occupational Health and Safety Act no 85 of 1993 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 Occupational Health and Safety Act no 85 of 1993.

The Contractor provides a health and safety plan based on the Employer's Safety, Health and Environmental Specification.

All persons entering the Site must undergo the Employer's safety induction course.

The designer of the Works is mandated to comply with section 6 of the construction regulation 2014.

2.3.1 Safety of Worker

The Contractor is to ensure the safety of all persons working on the Site.

Any hot work, including welding, will be applied for in accordance with the permit to work system.

No hot work will be allowed on Site unless a hot work permit is granted in writing.

Precautions must be taken to prevent any objects, welding or grinding sparks from falling beyond the immediate working area.

Ear protection and all required PPE must be provided to all personnel by the Contractor.

The Contractor completes activity risk based assessments and provides the assessments to the Project Manager for acceptance before activities take place.

2.3.2 Fire Protection

The *Contractor* must ensure that his employees are trained in the use of firefighting apparatus.

The *Contractor* must take 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 must not be used for work or storage at any time. Firefighting equipment must remain accessible at all times.

In case of a fire, the *Contractor* must immediately report the location and extent of the fire to the Electrical Operating Desk using the station's Emergency Number. The *Contractor* must take the necessary action to safeguard the area to prevent injury and spreading of the fire.

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS**2.3.3 First aid**

The *Contractor* provides First Aid services (level 2) to his employees and sub-*Contractors*. In the case of severe or serious injury, to his employees and sub-*Contractors* the *Employer's* Medical Centre and facilities will be made available and accessible to such persons.

2.3.4 Housekeeping

It is the *Contractors* responsibility to ensure that the Site is cleaned daily. All electrical cables and hoses are routed so as not to cross unprotected over floors and walkways. All equipment is packed neatly without interference to access. All excess scaffolding material is removed from Site after the scaffolding has been erected. The *Contractor* is responsible for the removal of any scrap material to the designated scrap area on a daily basis.

2.3.5 Barricading

Access to danger zones is restricted using handrail type guards at least 1.2 meters high and able to block access to the danger zone. Red tape is not allowed. Symbolic safety signs depicting 'Danger', name of Contractor, Responsible Supervisor, Contact details of supervisor and 'No entry' are attached to the guards. This includes access during the taking of X-rays.

2.3.6 Radiographic Examinations

When radiographic tests are carried out in the plant by Others, the danger area is evacuated with the exception only of authorized radiographic workers, and thereafter barricaded. To ensure that employees and contract staff working in Employer's premises are not exposed to more radiation than is reasonable level, the Contractor complies with the Kusile Power Station procedure 'Requirements and Rules for Radiation Protection and Safety of Radiation Sources'.

2.3.7 Permit to Work System

The *Contractor* allocates personnel to be trained and authorised as Responsible Persons according to *Employer's* Plant Safety Regulations (36-681). The *Contractor* ensures that adequate number of appointed Responsible Persons and Authorised Supervisors prior to the outage date or commencement of work at the station. The *Contractor* ensures that Responsible Persons and Authorised Supervisors are available on Site at all times during the execution of the Work.

If the *Contractor* breaches this obligation, the *Employer's Project Manager* withholds monthly payments until the *Contractor* complies with this obligation.

2.4 Environmental constraints and management

- a) The contractor and or supplier shall have a documented and implemented environmental management system e.g. environmental policy, operational procedures relating to their activities, Environmental Aspects and Impacts Register.
- b) The contractor and or supplier shall prepare an environmental management plan relating to their activities that will be carried out. The environmental management plan shall be based on, amongst others, Eskom Kusile Power Station's OEMP and any other applicable environmental legislation. The environmental management plan must include all the aspects and impacts relating to the activity and address the principle of continual improvement.
- c) The contractor and or supplier employees shall attend induction on environmental management prior to commencement of work at Kusile Power Station.
- d) The contractor and or supplier shall comply with all Eskom Kusile Power Station environmental requirements such as policies, standards and procedures.

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

- e) The contractor shall appoint trained and competent personnel in writing, who will have the responsibilities of implementing all environmental requirements on a specific contract.
- f) Non-conformance and All spills/emergency incidents shall be reported to Eskom Contract Manager and Environmental Officer(s) immediately on occurrence, such reports must include but not limited to the following information:
 - a. The date and time of the incident
 - b. The cause of the non-conformance/incident;
 - c. The proposed actions to correct and prevent recurrence.
- g) Eskom Kusile Power Station shall issue non-conformances where there are deviations from Eskom Kusile Power Station Procedures and any other environmental requirements, and the Contractor or Supplier shall be responsible to provide an action plan and close out of such non-conformances timeously.
- h) Environmental Incident Investigations shall be done jointly where responsible managers and the environmental team from Eskom and the Eskom subsidiary or contractor are present.
- i) Environmental Incident investigation shall be done in accordance to Eskom Environmental Incident Management Procedure (240-133087117).
- j) The contractor or supplier shall be responsible to ensure duty of care during execution of work at Kusile Power Station and shall be liable for the costs for the costs of remedying pollution, *environmental degradation and consequent adverse health effects as indicated on the NEMA principles below:*

National Environmental Management Act 107 of 1998 (NEMA) principles:

- Duty of care and remediation of environmental damage

Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorized by law or cannot reasonably be avoided or stopped, to minimize and rectify such pollution or degradation of the environment.

- Polluter Pays Principle

The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.

- a) The *Contractor* and or supplier shall allocate funds for the implementation of environmental requirements.
- b) All contractors shall abide to Eskom Zero Liquid Effluent Discharge through the process of reuse and recycling.
- c) All waste generated during the execution of the scope of work shall be managed in accordance with Kusile Power Station Waste Management Work Instruction (240-105776552) and in compliance with applicable environmental legislation and bylaws.
- d) All contractors should be aware of Eskom SHEQ Policy.
- e) All contractors must consider environmental consideration when carrying out Risk Assessments.
- f) All equipment used on site must be in good working condition and no fuel and/or oil leaks on any plant will be tolerated.

Records to be kept onsite for Environmental Management

The following minimum records shall be kept on sites:

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

- a) Contractor site specific Environmental Management Plan and Environmental aspect and impact register. Environmental aspect must be identified, and how they should be mitigated and also be communicated to employees. Proof of communication must be available
- b) Environmental Incident registers and investigation reports. Incident must be reported immediately or within 24 hours of occurrence, investigation must take place within 7 days and concluded with 30 days, lesson learned must be shared with employees. Record of environmental incidents must be made available.
- c) Non-conformance register. When non-conformances are closed, they should be investigated and close-out within the agreed timeframes.
- d) Complaints register. Where complaints are raised they should be reported to Kusile Environmental management Department, be investigated and closed out.
- e) Waste disposal register
- f) Hazardous Substances registers and SDS where applicable. Where hazardous substances are used, a register should be maintained and all SDS should be available and communicated to employees.
- g) Records of audit reports and audit findings close-out, where applicable.
- h) Records of audit and how findings where closed should be maintained.
- i) Records of environmental inspections conducted. Monthly environmental inspection should be conducted and records of inspections should be maintained.
- j) Licences for Landfill sites/Waste Treatment plant for all waste streams generated and disposed by the contractor.
- k) Registration certificate for a waste service provider appointed by the contractor
- l) Safe disposal certificates or weighbridge certificates for all waste disposed.

Tender Submission Documentation

The following documentation shall be submitted with all tender submissions:

- a) Environmental Policy
- b) Aspect and impact register or an environmental management plan (relevant to the scope of work)
- c) Environmental Management System Certificate (if certified) if not, an environmental management system manual or procedures
- d) Waste Management Plan
- e) Proof of training of persons performing activities that could have significant impact on the environment.

2.5 Quality assurance requirements

2.5.1 Quality Management

The quality requirements are as per ISO 9001:2008 and *Employer* Quality Standard, QM 58. This quality management philosophy is developed from the basis that manufacturers produce quality products, supervisor oversees the process, checks quality but liability for quality remains with the *Contractor*. The *Contractor* submits a QMS as a returnable schedule and uses it for all phases of the Project. The QMS complies with the requirements of ISO 9001:2008 standard. The *Contractor* provides evidence of a fully implemented QMS as and when requested by the *Project manager*.

The *Project Manager* may at his sole discretion carry out an audit on the *Contractor*, the *Contractor's* suppliers and Sub-*Contractors*

Quality control plans will be produced by the *Contractor* or manufacturer which will indicate the level of product quality control to be applied. The QCP must be aligned to, and reference ISO 10005:2005 QMS, guidelines for quality plans and in compliance with the guideline in 240-105658000. The QCP will make reference to the *Contractor's* QMS Procedures to be used in this Contract. This plan will be reviewed by the

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

Project Manager. The project team monitors that these plans are being implemented and that it is yielding the expected results through process and product verifications.

High quality standards are also assured by conforming to the following:

- a) The use of sound design and engineering principles,
- b) The design process uses a good performance and functional specification,
- c) It is ensured that the installation conforms to the Works Information.
- d) Design Review Procedure is followed
- e) Engineering Change Procedure
- f) QA/QC on project (manufacturing, installation)

The *Contractor* submits the following documents within ten (10) working days of the Contract Date to the *Project Manager* for review and acceptance prior to the commencement of work:

- a) The *Contractor's* QMS compliance with the requirements of ISO 9001:2008
- b) *Contractor's* quality manual
- c) *Contractor's* quality procedures
- d) *Contractor's* quality forms and work instructions
- e) *Contractor's* quality system documents referenced in this Works Information

The *Contractor* supplies the *Project Manager* with a QCP or ITP for review and acceptance.

The *Contractor* supplies the *Project Manager* with a detailed contractor organogram showing the quality personnel to be used in the Contract. The *Contractor* provides CVs of the quality management employees who will be responsible for quality.

The *Contractor's* Quality Management employee's responsibilities include but are not limited to the following:

- a) Implementation of the QMS
- b) Administration of QA/QC systems
- c) Verification of approval status of Sub-*Contractor's* QCP and procedures
- d) On-and -offsite inspections
- e) Co-ordination, inspection and verification of the *Employer's* intervention points
- f) Review of *Contractor* testing and inspection documents (procedures, test results)
 - Reporting on quality performance

The requirement to submit these documents does not constitute a compensation event.

2.5.2 Quality Responsibility

- a) The *Contractor* is accountable for the quality of the output and liable for any failures.
- b) The *Contractor* is responsible for defining the level of intervention of QA/QC or inspections. These are in line with the *Employers* requirements.
- c) The *Contractor* is responsible for defining the level of intervention of QA/QC or inspections to be imposed on his Sub-*Contractor's*, suppliers and sub-suppliers and must ensure that these are in line with the *Employer's* requirements.
- d) The intervention requirements take into consideration the criticality of the Plant and Material.
- e) The intervention points include all witness, hold, verification and review points required by the *Employer*. The *Contractor's* failure to allow the intervention points will constitute a non-conformance.

2.5.3 Non-Conformances and Defects

Where NCR's and Defect notifications are issued, the *Contractor* acknowledges receipt within 48 hours and proposes corrective and preventive actions to the *Project Manager* as per the contract response period. The

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

corrective and preventive actions will include the implementation and completion dates. Progress on all NCR's and Defect notifications issued to the *Contractor* must be reported to the *Project Manager* on monthly basis.

The *Contractor's* Quality Manager keeps a register of all NCR's and Defect notifications issued. Deviations from the Contract are treated as a non-conformance. Records of NCRs and Defect notifications are kept and form part of the data book records.

During the contract execution phase, the *Contractor* will be monitored by the *Project Manager* for performance on quality related aspects. The monitoring will be in the form of audits and assessments.

2.6 Programming constraints

2.6.1 Inclusions in the programme

General

This contract shall follow ECC contract, Clause 3-Time.

The Contractor submits a Level 4 Microsoft project or Primavera P6 programme for the project manager acceptance.

- Discipline Speciality Program (Level 4)

This is the execution Schedule, also called a Project Working Level Schedule. Level 4 is the detailed working level schedule, where each schedule is an expansion of part of a Level 3 schedule and is established within the integrated project schedule.

This programme typically represents day-to-day tasks which are work unit based and become summarised in the Level 3 activities showing the following:

- The starting date, access dates, key dates, and planned completion date.
- The order and timing of all tasks which the contractor plans to do in order to provide the works
- Critical path
- Float
- Time risk allowances, which shall include weather allowance.
- Health and safety requirement

2.6.2 Computerised Planning and Reporting

The programme shall be submitted in MS Project/ Primavera P6 format and the basis of schedule to support the schedule, showing inclusion and exclusions.

2.6.3 Project Calendar

The project calendar includes working days (Monday to Friday) and excludes non-working days which are weekends (Saturday to Sundays) and Public Holidays. If and when the Contractor deems any period in a calendar year as a non-working day, e.g. pay weekends, etc. such shall be declared up front and agreed with the Project Manager in the first programme for acceptance by the Project manager. Failure to declare these days shall render any later declaration as null and void and the Contractor shall provide the services to comply with the accepted first programme.

2.6.4 Additional Programme Requirements

The programme layout takes into account the Key Dates provided in the Contract and the Work Breakdown Structure (WBS).

The following levels of programme are to be used for this project for dynamic integrated project control:

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

- Management level programme (Level 1)
- Project level programme (Level 2)
- Control level programme (Level 3)
- Discipline speciality programme (Level 4)

2.6.5 Submission of Revised Programmes

The Contractor submits one electronic copy in MS Project (MPP) of the revised programme to the Project Manager for acceptance. The contractor shows on each revised programme.

- The actual progress achieved on each operation and the timing of the remaining works
- The effects of the implemented compensation event
- How the contractor plans to deal with any delay and to correct the notified defects
- Any other changes that the contractor proposes to make to the acceptance programme.

2.6.6 Bi-Weekly Progress reporting

A bi-weekly status report is submitted by the Contractor to the Project Manager. The Contractor submits updated programme bi-weekly or as instructed by the Project Manager.

. Contents of a weekly report will include the following items:

- The updated MS Project/ Primavera P6
- Programme summary narrative (Basis of schedule)
- Progress and performance summaries
- Key Milestone status

2.7 Contractor's management, supervision and key people

Contractor to submit an Organogram for the company indicating all roles and responsibilities relevant to the implementation of the work stated in this document. The *Contractor* is required to make all appointments as per the technical, Quality and Health and Safety and Environmental requirements. The *Contractor* shall provide all SHEQ and compliance documentation which include but not limited to the following:

- SHEQ policy
- SHE Plan
- Environmental Plan
- Environmental Policy
- Risk Management Plan
- Baseline Risk assessment
- All accreditation and qualifications
- Technical and professional organizations affiliations.
- SHEQ appointments
- SHEQ accreditations

2.8 Invoicing and payment

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

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

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

- Name and address of the *Contractor* and the *Service Manager*;
- The contract number and title;
- *Contractor's* VAT registration number;
- The *Employer's* VAT registration number 4740101508;
- Description of service provided for each item invoiced based on the Price List;
- Total amount invoiced excluding VAT, the VAT and the invoiced amount including VAT;
- The invoice is to be submitted to invoiceseskomlocal@eskom.co.za once confirmed with the payment certificate.

2.9 Contract change management

Contract change management shall be done as per the NEC ECC compensation event process.

3 Engineering and the *Contractor's* design

3.1 *Employer's* design

No new designs required, the scope is for replacement of components in the existing plant.

3.2 As-built drawings, operating manuals and maintenance schedules

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

4 Procurement

4.1 People

4.1.1 Minimum requirements of people employed on the Site

Eskom Holdings Limited's requirements regarding employment of unskilled or semi-skilled workers are as follows:

Kusile Power Station requires that during recruitment of unskilled or semi-skilled labour, the *Contractor* or its subsidiaries should make every effort to employ minimum target as per SDL&I requirements. The *Contractor* shall under no circumstances be allowed to recruit labourer(s) at Kusile Power Station main security gate. The *Contractor's* employees shall undergo security screening/clearance obtainable from SAPS or MIE or any accredited institution.

4.2 Subcontracting

4.2.1 Limitations on subcontracting

The *Contractor* may sub-contract specialised work and shall not subcontract more than a 25% of the value of the contract to any other entity that does not have an equal or higher B-BBEE status level of a contributor than the supplier concerned unless the contract is subcontracted to an EME that has the capability and ability to execute the subcontract work.

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS**4.3 Plant and Materials****4.3.1 Quality**

- a) The Contractor is responsible for defining the level of QA/QC (intervention Points) or inspection to be imposed on his Subcontractors and suppliers of material in the Quality Control Plans (QCPs).
- b) The Contractor submits monthly, the following QA returns:
 - A register of Defects with those older than 30 days being flagged, and an explanation attached.
 - Register of accepted Defects
 - A register of Non-Conformance Report
 - Monthly Project Quality Report
 - Monthly updated Site and pre-site programmes
 - Inspection dates
 - Site Acceptance Tests
 - Inspections completed / outstanding

5 Construction**5.1 Temporary works, Site services & construction constraints****5.1.1 Employer's Site entry and security control, permits, and Site regulations**

All persons entering the Kusile Power Station site pass through the control points at the main access gate and are required to have temporary permits that are issued to *Contractor's* staff on request. All persons submit ID documents with the application for temporary permits. If it is necessary to bring equipment onto site a list is submitted which is verified by security staff prior to equipment entering the security area.

If any *Contractor's* staff are transferred from Kusile Power Station or leave site, the person's permit is handed over to the Supervisor. The *Contractor* ensures that personnel leaving site are transported out of the security area and that the permit is returned.

No firearms, weapons, alcohol, illegal substances and cameras are permitted on site. Any person suspected of being under the influence of alcohol is tested and if proved positive, is refused entry to the security area.

No "private work" is carried out for or on behalf of any Eskom employee.

Under no circumstances shall the *Contractor* recruit outside Kusile Power Station's security gate. An applicable local office for recruitment shall be used.

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

The generator, transformer area and the other station restricted area are barricaded and out of bounds and only authorised persons are permitted. Areas outside the site are out of bounds to the *Contractor's* staff.

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

The *Contractor* keeps records of his people on Site, including those of his Subcontractors which the Project Manager or Supervisor have access to at any time. These records may be needed when assessing compensation events.

5.1.4 Title to materials from demolition and excavation

The *Contractor* has no title to materials from excavation and demolitions.

5.1.5 Cooperating with and obtaining acceptance of Others

The Contractor may be required to give or obtain access from Others during execution of the *Works*.

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS**5.1.6 Publicity and progress photographs**

The *Contractor* shall not take any photographs on site without the *Employer's* written permission.

5.1.7 Contractor's Equipment

Contractor's equipment shall be clearly marked, as tools and material need to be declared at the gate before entering the site, and the same declaration shall be used to remove equipment from site.

5.1.8 Site services and facilities

The *Employer* shall provide power supply connection point in the form of 220V AC power, water, waste disposal skips. The *Contractor* shall provide everything else necessary for Providing the *Works*.

5.1.9 Facilities provided by the Contractor

The Contractor shall provide for his own Site accommodation, construction camps, storage, vehicles, office equipment and all other requirements deemed necessary for him to do site establishment. Upon completion of the contract, the *Contractor* shall do site de-establishment and restore the allocated area to its original state.

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

Scanning of underground services and utilities shall precede all excavation works. The Contractor shall obtain all relevant drawings, indicating the position of potential underground services in the project area. Care shall be taken by the Contractor to properly demarcate and protect all existing services. Should any service be damaged by the Contractor, it is the responsibility of the Contractor to report such damage to the Employer immediately. If any service or structure is damaged by the Contractor, that should have been located or protected by the Contractor, the Contractor shall be liable for the repair works.

5.1.11 Control of noise, dust, water and waste

Where there is work to be performed in the buildings occupied by personnel and noise and dust may be induced, it is the responsibility of the *Contractor* to inform the Project Manager for awareness and preparation to mitigate.

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 *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.

5.2.2 Use of the works before Completion has been certified

The *Employer* shall certify the *Works* before use.

5.2.3 Commissioning

The Contractor shall test, verify, and commission the equipment. The Contractor submits all drawings and data for the installed equipment to the *Project Manager*. Submit all relevant documentation (not limited to below):

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

- *Contractor's* Commissioning Procedure
- Full equipment list with applicable manuals.
- Operating and maintenance manuals for equipment installed.
- Commissioning and testing documentation.
- Submit all the signed QCP and ITP documentation.
- Provide warranties and guarantees documentation for all installed equipment once work is completed.

5.2.4 Take over procedures

Take over is after or at the same time as Completion. The *Employer* may require the *Contractor* to provide assistance, security personnel on a temporary basis etc.

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

The *Employer* shall arrange a Permit To Work to allow the *Contractor* to access and use part of the *Works* which has been taken over if needed to correct a Defect. After the *Works* have been put into operation, the *Employer* may require the *Contractor* to undertake certain procedures before such access can be granted.

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS

6 List of drawings

6.1 Drawings issued by the *Employer*

The *Employer* shall issue applicable drawings for the existing cables.

COPPER EARTHING CABLES REPLACEMENT WITH ALTERNATIVE CABLES AT KUSILE POWER STATION FOR A PERIOD OF 3 MONTHS