PART 3: SCOPE OF WORK

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C3.1: EMPLOYER'S WORKS INFORMATION

Contents

1 Description of the *works*

1.1 Executive overview

The purpose of this document is to outline the technical specifications for the installation of a comprehensive surveillance camera system at Kusile Power Station. The installation of the surveillance system with artificial intelligence (AI) features aims to enhance site security, operational monitoring, and safety compliance at the power plant, ensuring the safety of personnel, protecting critical infrastructure, and enabling effective incident response.

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

CCTV systems provide surveillance capabilities used in protection of people, assets, and systems. A CCTV system serves mainly as a security force multiplier, providing surveillance for a larger area, more of the time, than would be feasible with security personnel alone. CCTV systems are often used to support comprehensive security systems by incorporating video coverage and security alarms for barriers, intrusion detection, and access control. For example, a CCTV system can provide the means to assess an alarm generated by an intrusion detection system and record the event.

The cameras installed at Kusile Power Station are not enough to cover all critical areas, the various stakeholders have identified more areas that require surveillance for protection of people, plant, systems, and monitoring of critical plants where visuals will help controllers to manage and control the plant better.
To design such an integrated system with required interfaces, a comprehensive site survey to support the development of detailed equipment specifications, installation design, and ultimately a thorough system test requires a specialised skill set. These skills and capabilities cannot be sourced within the organisation.

1.3 Interpretation and terminology

The following abbreviations are used in this Works Information:

Abbreviation	**Meaning given to the abbreviation**
AGC	Automatic Gain Control
CCTV	Closed-Circuit Television
DVM	Digital Video Manager
AI	Artificial Intelligence
DVR	Digital Video Recorder
FPS	Frames per Second
LCD	Liquid Crystal Display
ONVIF	Open Network Video Interface Forum
RAM	Reliability, Availability and Maintainability
SNR	Signal to Noise Ratio
WBC	White Balance Control

1.4 Definitions

1.4.1 Disclosure Classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

Table 1: Definition of Terms

Term	Definition
Automatic Gain Control	Automatic gain control (AGC) increases the cameras sensitivity automatically when the ambient light deteriorates.
Availability	Relates to the ability of the system-of-interest to be accessed and operated when needed.
Back Light Compensation	Electronically compensates for high background lighting to give details which would normally be silhouetted.
CCTV Camera	The unit that contains an imaging device that produces a video signal from an optical image.
CCTV system	A system that consists of camera equipment as well as any monitoring and associated equipment for transmission and controlling purposes that is necessary for surveillance of a defined security zone.
Constrained	A statement that expresses measurable bounds for an element or function of the system. That is, a constraint is a factor that is imposed on the solution by compulsion and may limit or modify the design changes.
Coverage Distance	The distance covered visually between a fixed camera's position and the next camera.
Frames Frequency	The number of frames per second (fps).
Maintainability	Relates to the ability of the intended system to be easily serviced or repaired, including the ability to be easily diagnosed. In this context, maintainability is synonymous with 'Repairability' or 'Serviceability'.
May	Expresses a non-mandatory suggestion with optional compliance by the implementer.
Must	Preferably not used in requirement statements. If both "shall" and "must" are used there is an implication of difference in the degree of responsibility upon the implementer, which is undesirable.
ONVIF Compliance	ONVIF is an international specification with the aim of 'promoting and developing global standards for interfaces of IP-based physical security products.
Reliability	Relates to the ability of the intended system to perform within the specification limits with correct and consistent results over time. This includes the numerical reliability characteristics (with confidence levels, if appropriate).
Remotely Configurable	Ability to change camera settings through a network.
Shall	Expresses a mandatory demand or a binding requirement.
Should	Expresses a non-mandatory preference, desire, target or recommendation. Other implementations of the requirement can be accepted, but the implementer (if challenged) should be able to demonstrate that these other implementations are equivalent or better.
Signal to Noise Ratio	The ratio between useful television signal and disturbing noise signal.
White Balance Control	Automatically adjusts a colour camera's colour to maintain white areas.
Wide Dynamic Range	Ability of camera to provide clear images when there are very light and very dark areas simultaneously in the camera's field of view.
Will	Expresses the future tense or a declaration of intent. For example, "The operator will initialise the system by…" conveys an item of information for the designer but it does not constitute a requirement on the designer.

1.5 Details Of The Scope Of Works

1.5.1 Identification

The areas will be identified for the additional CCTV cameras at Kusile Power Station. The composition of these areas will consist of a combination of cameras covering them and will be as follows Table 2.

Area (Location)	**Monitoring Centre (Display)**
Station Lifts	Main Control Room
Switchgear/Equipment Rooms	
Mills	
Fans (ID, FD, PA)	
Turbine Hall and Auxiliary Plants	
Submerged Scrapper Conveyors	
Four Dewatering Lines at FGD, including Head Ends	FGD Control Room
Dewatering Building	
Gypsum Transfer Houses	
Reagent/ Ball Mill Areas	
Recirculation Pumphouses	
Coal Weighbridge Offices	BOP Control Room
Coal Offloading and Weighbridge Areas	
Coal Stockyard	
Drum Reclaimers	
Buffalo Feeders	
Coal Belts and discharge points from stockyard up to units	
Terrace Ash Conveyor	
Radial Stack Conveyor	
Fuel Offloading Station	
Coal Transfer Houses	
Coarse Ash Conditioners	BOP Control Room
Top of Ash Silos	
Ash Conditioners at BOP	
Ash Emergency Stacker	
Ash Plant Transfer Houses	
Limestone Stock Yard	
Limestone Hopper Offloading Facilities	
Limestone Conveyor 3	

1.5.2 System Overview

A Closed-Circuit Television (CCTV) with Artificial Intelligence (AI) features is an advanced surveillance system that not only records and streams video but also analyses footage in real time using AI algorithms. Unlike traditional CCTV, which requires human operators to monitor and interpret activity, AI enabled CCTV can automatically detection intrusions, identify objects or faces, recognize licence plates, track movement patterns, and raise instant alerts for suspicious behaviour or safety violations.

1.6 Scope

The scope of this document is limited to the additional CCTV surveillance system with AI features at strategic listed areas in Kusile Power Station. The design for the surveillance camera system shall consider the following:

1.6.1 Cameras

Specifications for cameras strategically placed to cover the identified critical areas in Table 2.

Table 2: Minimum specifications for cameras

Characteristics	Requirements
AGC (Automatic Gain Control)	Must automatically adjust brightness to ensure clear images under fluctuating lighting conditions indoors/outdoors
BLC (Back Light Compensation)	Required to manage glare and strong backlight especially in turbine halls and areas with reflective surfaces
Coverage Distance	Minimum 100-200m clear coverage for wide industrial zones like coal and ash plants
Frame Frequency	25-30 fps minimum for smooth monitoring and accurate AI event detection in high activity areas
Lens	Varifocal/zoom lens (2.8-12mm or higher) for flexibility in monitoring both wide areas and specific machinery
ONVIF Compliance	Must be ONVIF compliant to integrate seamlessly with existing video management and AI systems
Image format	Support JPEG, H.264,H.265 for efficient storage and transmission over power station networks
Remotely Configurable	Cameras must allow remote adjustment of zoom, focus, exposure, and analytics setting for operational ease.
Resolution	Minimum 1080p (Full HD); 4K preferred for high detail monitoring in critical plant areas
SNR (Signal to Noise Ratio)	Greater than 50 dB for high quality imaging, especially on low light coal and turbine areas
WBC (White Balance Control)	Auto/Manual modes to ensure accurate colour in varying lighting across indoor and outdoor zones
Wide Dynamic Range (WDR)	>120 dB to handle extreme contrast in environments with shadows, machinery lights, and sunlight
Scalability and Flexibility	Must support system expansion, integration with AI analytics, and

	compatibility with future upgrades
Environmental Damage Resistance	Industrial grade IP66/67 and IK10 ratings to withstand dust, moisture, vibration, and impacts in harsh conditions.

NB: all cameras shall have a 360-degree coverage and motion detection for comprehensive surveillance.

1.6.1.1 Recording and Storage

i. Continuous recording with configurable frame rates and resolutions.
ii. Storage capacity to retain footage for a minimum of 30 days/month.
iii. Redundant storage solutions for data backup.

1.6.1.2 Network Infrastructure

i. Integration with the existing power plant network.
ii. Scalability to accommodate future expansion.
iii. Network security measures, including encryption and secure access protocols.

1.6.1.3 Monitoring and Control

i. Centralized monitoring station with a user-friendly interface (suitable location to be proposed/identified).
ii. Real-time monitoring capabilities for security personnel.
iii. Remote access for authorized personnel (names to be provided by the Client).

1.6.1.4 Integration

i. Seamless integration with access control systems, alarms, and other security infrastructure.
ii. Compatibility with industry-standard and national Key Point protocols.

1.6.1.5 Power Supply

i. Power-over-Ethernet (PoE) support for simplified installation.
ii. Backup power solutions to ensure continuous operation during power outages.

1.6.2 Compliance and Standards

The surveillance camera system must comply with relevant security, industry standards and regulations, including but not limited the list section **Error! Reference source not found.**. The contractor shall provide documentation certifying compliance with these standards.

1.6.3 Installation, Commissioning and Maintenance Requirements

1.6.3.1 Installation Plan

i. Detailed installation plan outlining camera placement, cabling, and mounting specifications.
ii. Compliance with safety regulations during the installation process.

1.6.3.2 Commissioning

i. Comprehensive testing and calibration of all cameras.
ii. System verification to ensure proper functioning.

1.6.4 Maintenance and Support

1.6.4.1 Warranty

i. Minimum 8 to 10 years warranty for all hardware components.
ii. Schedule for maintenance and requirements.

1.6.4.2 Maintenance Services

i. Regular maintenance schedule to ensure optimal system performance and availability.
ii. Allow for prompt response times for issue resolution.

1.6.5 Documentation

The contractor shall provide comprehensive documentation, including but not limited to:

i. System architecture diagram.
ii. User manuals for system operation and troubleshooting.
iii. As-built documentation.

NB: Documentation formatting and labelling requirements shall be as per the Eskom requirements to be provided to the successful contractor.

Table 3: Applicable Standards and Codes

Document title	Document number	Revision
[1] Video Surveillance Systems for use in Security Applications.	BS EN 62676-4	
[2] Electrical security installations - CCTV installations – CCTV surveillance systems for use in security applications.	SANS 10222-5:2007	

Table 4: Applicable Eskom Documents

Document title	Document number	Revision
[3] Specification for CCTV Surveillance with Intruder Detection.	240-91190304	2
[4] Information Security - IT/OT Remote Access Standard	32-373	
[5] Cyber Security Configuration Guideline of Networking Equipment for Operational Technology	240-91479924	
[6] Specification for Electrical Terminal Blocks	240-70413291	
[7] Definition of operational technology (OT) and OT / IT collaboration accountabilities	240-55683502	
[8] Cyber security standard for Operational Technology	240-55410927	

Table 5: Other Applicable Documents

Document title	Document number	Revision
[9] Kusile Power Station Electrical Tunnel/Trench (Conceptual layout)	146838 ES 00071	A

1.6.6 Informative

The following documents as listed in table 8 **Error! Reference source not found.**, although not invoked in this specification, provide additional information or examples.

Table 6: References

Document title	Document number	Revision
[10] Video surveillance systems for use in security applications.	IEC EN62676-4	
[11] IEEE Guide for Developing System Requirements	IEEE Std1233	1998

Specifications.		
[12] Systems and software engineering, Life cycle processes, Requirements engineering.	ISO 29148	2011
[13] European Standard: Alarm systems.	EN 50132-1	2010
[14] Planning, design, installation and operation of CCTV Surveillance Systems	BSIA	2014
[15] Quality Management Systems	ISO 9001	

2 System Requirements

The components that are common to the existing and the extension system and are required for the entire system to operate are not listed since they are already available. The extended CCTV system can be broken down into four parts. These parts indicate the chain of signalling to provide the footage from the cameras to where the footage is required.

Monitoring Stations: These are the points where a human operator accesses the live and archived/recorded footage from the cameras. These are the access points for the system, and they are made up of the physical machines and the software running on them. Desks and chairs are not included.

Camera Servers: The DVM Camera Servers run the DVM camera server software package which allows interfacing to cameras, analytics, and basic camera administration, amongst others.

Network and Cabling: This consists of network switches and the wired or fibre links joining the network components to each other and to the existing network. Included are the cable trunking, conduits and supports for the conduits.

Field Devices: These include the cameras installed in the area to be monitored as well as supporting equipment e.g., illuminators, supports, shields etc.

2.1 System Definition

2.1.1 Context

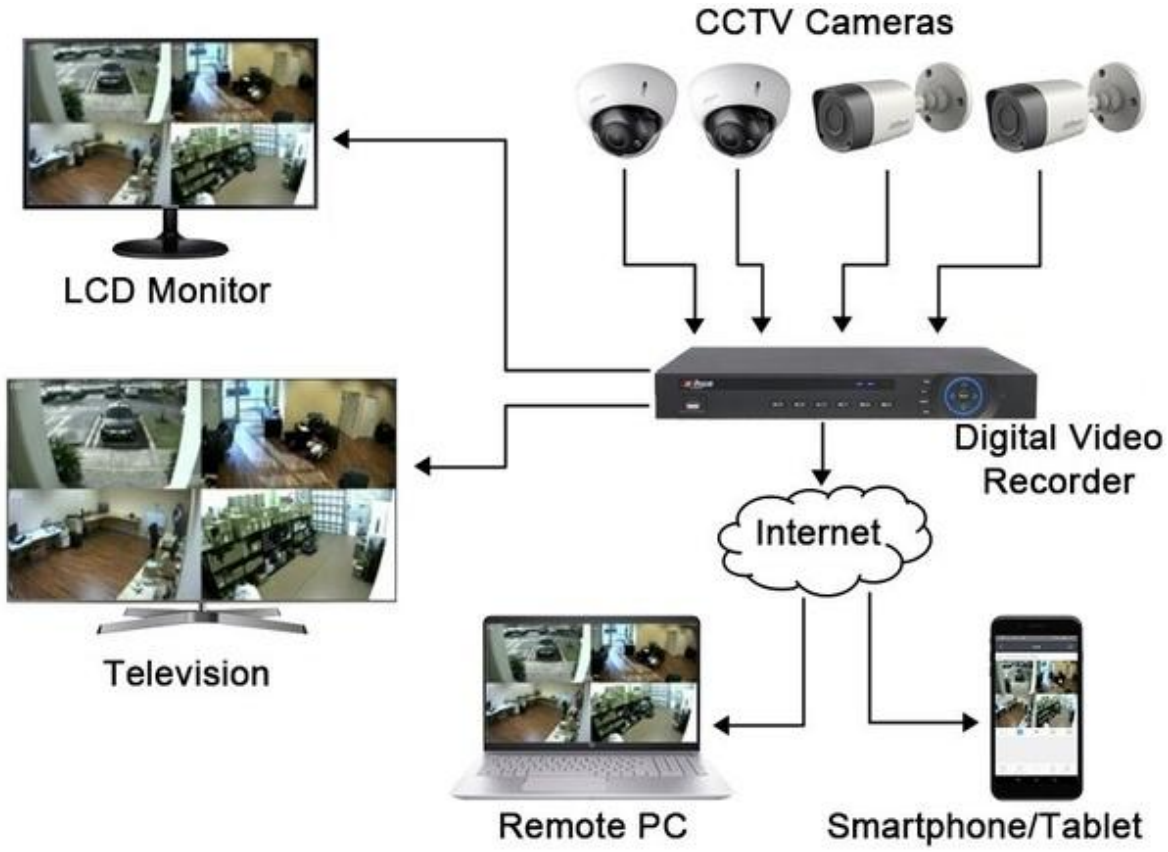

Figure 1: Overview of additional CCTV system – Plant Monitoring

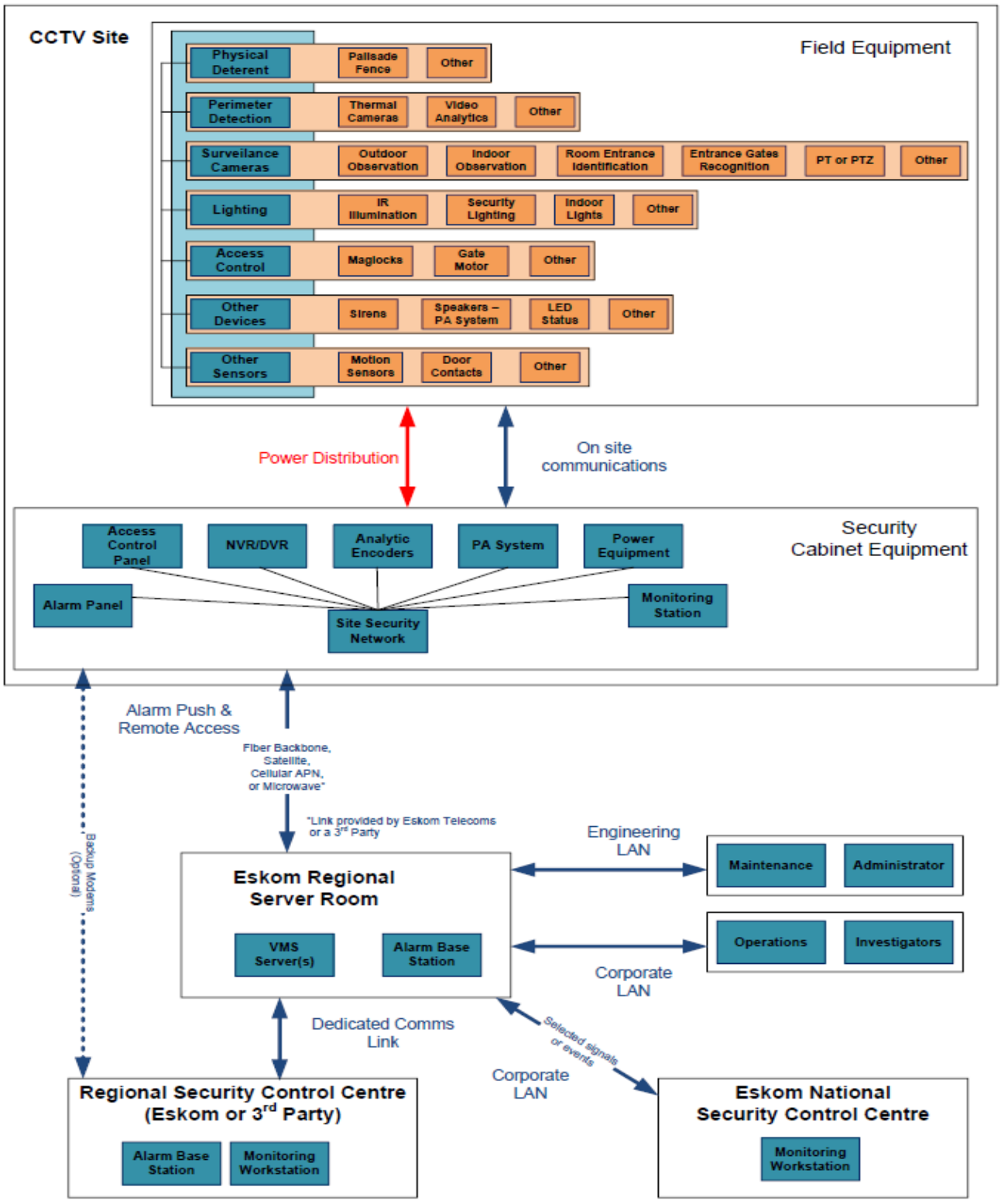

Figure 2: Functional Block Diagram of CCTV System - Security

2.1.2 External Interfaces Identification

i. The external interfaces for the monitoring system will be the remote access capabilities.
ii. The external interfaces for the security system are to the Eskom National and Reginal Security Control Centre.
iii. The designs (especially for security) shall be able to interface to the existing system (Honeywell EBI R500 and DVM R700).

2.2 REQUIRED STATES AND MODES

i. Any additions to the existing infrastructure shall not impact the current modes of operation.
ii. The system shall be available during power failures.
iii. Maintenance shall be minimal to minimise downtime.

2.3 SYSTEM FUNCTION AND PERFORMANCE REQUIREMENTS

The following formulae shall be used to evaluate the performance of CCTV and Intruder detection systems and shall be calculated monthly (adapted from DISPAVACE8).

System Availability

System Availability shall be greater than 98%

$$\boldsymbol{System\ Availability} = (\boldsymbol{Total\ hours}) / (\boldsymbol{Total\ non\ operational\ hours})\boldsymbol{Total\ Hours} \times \mathbf{100}$$

This can be calculated per site or per region.

System Reliability

Monthly System Reliability shall be greater than 95%

$$\boldsymbol{Monthly\ System\ Reliability} = \boldsymbol{Number\ of\ Faults\ in\ a\ Month} / \boldsymbol{Number\ of\ Systems\ Installed} \times \mathbf{100}$$

This can be calculated per site or per region.

System Dependability

Any single zone of the alarm / detection system shall give no more than 7 false detections in any 7-day period.

To measure this as a KPI, the following formulae below shall be used.

Monthly System Dependability shall be greater than 85%

$$\boldsymbol{Per\ Site\ System\ Dependability} = (\mathbf{1} - \boldsymbol{Number\ of\ false\ alarms\ in\ a\ month} / \mathbf{400})^2$$

This calculation is per site. Per region, the System dependability is the average of the per site values.

NOTE: This formula was chosen so as to reflect the following:

- 0 false alarms is ideal – 100% Dependable.
- 7 faults per 7 days is acceptable - 85% Dependable.
- 30 faults per 7 days indicates a poorly functioning system – 50% Dependable.
- 100 false alarms per 7 days indicates an unusable system – 0 % Dependable.

2.3.2 System Function (Monitoring)

The specific functional requirements for this type of system:

i. Observation and identification will be required from cameras that will be for monitoring purpose.

ii. The monitoring will be onsite in the plant control rooms on the operator control desks (both units and outside plant). Remote access will be for the identified personnel.

2.3.3 System Function (Security)

Not part of this scope to be done by Eskom Security.

2.4 Relationships Between States, Modes And Functions

N/A

2.5 System external interface Requirements

See section 2.1.2

2.5.1 Interface

The system will interface with existing systems at Kusile Power Station and may require access clearance from others.

2.6 External environmental requirements

All equipment shall be designed for application in 'special' environmental conditions as follows (adapted from Table 2 of IEC 60255-1):

i. Ambient air temperature: -25°C to +55°C (installed indoors); or -25°C to +70°C (installed outdoors, within enclosures).

ii. Altitude: < 2 500 m.

iii. Pollution: Location in urban areas with industrial activities and without special precautions to minimize the presence of sand or dust (conditions as per classes 3C2 and 3S2 in IEC 60721-3-3).

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

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

vi. After fabrication, metal surfaces including doors and removable covers shall be prepared and finished with corrosion protection.

vii. Paint work damaged during transport and delivery shall be made good as per manufacturer repair specification at no cost to Eskom. If site re-painting is necessary, the equipment and labels shall be carefully masked, and any overpaint which occurs in spite of the masking must be removed. If the damage is not repairable, Eskom reserves the right to return the equipment.

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

ix. Equipment installed will need added dust protection.

x. Convection cooled (fan-less) equipment are strongly preferred. If fans are used, they shall be speed controlled and the electronics shall be isolated and conformal coated to protect against dust ingress.

2.7 External Resource Utilisation Requirements

i. The expected life of equipment under conditions specified **Error! Reference source not found.**shall be a minimum of 8 to 10 years.
ii. All power cable shall be appropriately sized to ensure voltage drops along cable runs remain within the operating specifications of the equipment being powered.
iii. All equipment shall be effectively protected against overvoltage due to lighting strikes or switching surges by strategically placed surge arrestors.

iv. Descriptive cable markings shall be used as agreed to with Eskom. These shall be reflected on the drawings.
v. Cable selection and routing shall always be done in such a way that operation of equipment is not affected by electrical interference. This may be achieved by separating power and communications cables, shielding of cables, or a combination of the two.
vi. Equipment shall not be affected by electrostatic discharges that are applied directly to the equipment or to metal objects in the proximity of the equipment: All electronic equipment shall be a class 2 device as specified in IEEE 1613-2009, 8 Electrostatic discharge tests.

2.8 Physical Characteristics Requirements

Over and above the requirements covered in section 2.6 and 2.7 above the following additional requirements shall be catered for:

i. Cable routing.
ii. Outdoor cables and trenching (where required).
iii. Interface to security cabinets.
iv. Backup power supplies.
v. Communication.

2.9 Safety

The site-specific Health and Safety plan shall be accepted by an Eskom Health and Safety practitioner before any installation begins.

2.10 Reliability, Availability and Maintainability

The RAM for the CCTV system must involves a combination of quality components, robust design, proactive maintenance, and user-friendly interfaces. Regular monitoring, testing, and adherence to best practices in system design and operation contribute to the overall effectiveness of the CCTV system in providing continuous and reliable surveillance.

2.10.1 Reliability

The reliability of the system shall have the ability to consistently, accurately capture and record video footage without failures or disruptions.

2.10.2 Availability

The availability of the system being supplied over its life in percentage of time shall be 99.99% or greater measured annually.

2.10.3 Maintainability

The system should be designed to cater for ease and efficiency of repairs (availability of spares), upgrades and maintenance.

2.10.4 Affordability

The design should try to minimise costs for construction plus running costs.

2.10.5 System Life-Expectancy

i. All equipment shall be supported and maintainable until the selected technology end of life.
ii. Proven technology shall be utilized.

2.11 Security

The system shall be designed to protect the plant and the station from unauthorised access and cyber-attacks.

2.12 Design and Construction Requirements

2.12.1 General Design and Manufacturing Process Constraints

a) Flexibility, expandability, scalability, and reusability must be provided to support future areas of growth or changes in technology and purpose:

   i. **Expandability:** the capability of the intended system to be easily modified in response to potential areas of growth in requirements. Once modified, the system may require different procedures with respect to operations, maintenance, or both.

   ii. **Flexibility:** the ease with which the intended system can be modified to be able to handle input variety and input volume changes, differing from those for which the system was specifically designed. An example would be anticipated changes in the quality of coal delivered to a coal-fired power-station at some future date.

   iii. **Scalability:** the capability of the intended system to continue operating correctly with minimal change in current procedures as the system is enlarged to accommodate growth; and

   iv. **Reusability:** the capability of the intended system to be deployed into scenarios different to the initial requirement and environment.

b) Training of personnel who will use or support the system identified by the client shall be provided.

2.12.2 Sub-System Requirements

N/A.

2.12.3 Engineering Disciplinary Requirements

Kusile Power Station engineers shall be able to connect to the Local OT Security Server remotely from the Eskom Engineering (OT) LAN to perform maintenance and administrative tasks on the system.

2.12.3.1 Civil and Structural

Catered for in the design proposals.

2.12.3.2 Mechanical and Materials

Catered for in the design proposals.

2.12.3.3 Chemical and Process

N/A.

2.12.3.4 Electrical

See section 2.7

2.12.3.5 Instrumentation and Control

Manual and automatic actions for system initiation and control, indicators, alarms, manual controls that are used to operate the system, required ranges and accuracies to be provided for in the designs.

2.12.3.6 Computer Hardware and Software

For any software that may require licences (if any):

i. All licenses covering the equipment, standard software and application software provided shall be provided for.

ii. All licenses shall remain valid in the event of the failure and replacement of faulty equipment.

iii. All licenses provided shall be valid for the entire life of the system being provided.

iv. All licenses shall be site licenses for use at Kusile Power Station Site.

2.12.3.7 Fire Detection and Protection

Catered for in the design proposals.

2.12.4 Human Factors Engineering Requirements

N/A.

2.12.5 Documentation

The Contractor is responsible to plan for the supply of the documentation during the design, supply, installation, testing, commissioning and handover of the CCTV System and a document is thus any written or pictorial information describing, defining, specifying, or certifying activities, requirements, procedures and or results.

All documentation (entire architectural, equipment room layout, loop diagrams drawings, datasheets etc.) issued by the Employer for this contract is copyright protected and are not to be copied or distributed by the Contractor [8].

The Contractor shall submit all documentation on a formal transmittal form in triplicate to the Project Manager. All documents, reports and engineering documentation shall be compiled and presented in English language be in the required Microsoft Office Word, PowerPoint, Excel, PDF and or Project file extensions format.

The Contractor shall implement a legible, comprehensive, and complete documentation (control system), including their revision status and of the document status in relation to the "as designed" system status. Software licence, network architecture manuals and drawings, document control, loop diagrams, termination diagrams are included.

The drawing documentation format shall include:

Drawing number (Employer and makers number)

i. Revision.

ii. Approval status.

iii. Location of drawing at that stage.

iv. Drawing KKS number.

v. Drawing description.

vi. Sheet number.

vii. Transmittal number.

2.12.6 Packaging, Handling and Transporting Requirements

i. All the identified equipment that will be supplied as part of the scope shall be packaged such that it can be easily transported without being damaged.

ii. Dedicated areas shall be provided by Kusile Power Station for temporary storage.

iii. A detailed inventory of all equipment that is stored in the storage areas shall be provided.

2.13 Other Requirements

N/A.

2.14 Precedence of Requirements

Shall be dealt with contractually.

2.15 Verification

The Contractor shall demonstrate that the CCTV System hardware equipment has been tested satisfactory by producing the test certificates. The contractor shall demonstrate the functionality of the system prior to the installation of the system in the production environment through a FAT. Furthermore, it is the responsibility of the Contractor to ensure that the system is tested after installation to the satisfaction of the Employer's data quality requirements with commissioning and a SAT.
The Testing environment needs to be accommodated that may be used as training once the system is deployed in production by the Contractor. As well as the production environment needs to be created for production or security. The submissions shall include the various test phases as stated in section 2.5 of [3].

2.16 Notes

This project is of a strategic nature and covers aspects of compliance to requirements of the National Key Point. All the information and discussions will be treated in strict confidentiality and should not be shared without the consent of Eskom.

3 Management and start up.

3.1 Management meetings

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

Title and purpose	Approximate time & interval	Location	Attendance by:
Project Kick-off Meeting	3 days Contract Award	Kusile Power Station	Employer, Contractor and Others
Execution Progress Meeting	Bi- Weekly	Kusile Power Station	Employer, Contractor and Others
Risk register and compensation events	Bi- Weekly	Kusile Power Station	Employer, Contractor

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.

3.2 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.*

3.3 Health and safety risk management

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-*Contractor*s, 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-*Contractor*s, 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.

3.3.1 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.

3.3.2 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.

3.3.3 First aid

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

3.3.4 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.

3.3.5 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.

3.3.6 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'.

3.3.7 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.

3.4 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.
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.

k) The *Contractor* and or supplier shall allocate funds for the implementation of environmental requirements.
l) All contractors shall abide to Eskom Zero Liquid Effluent Discharge through the process of reuse and recycling.
m) 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.
n) All contractors should be aware of Eskom SHEQ Policy.
o) All contractors must take into account environmental consideration when carrying out Risk Assessments.
p) 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:

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.

3.5 Quality Assurance Requirements

3.5.1 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-*Contractor*s
Quality control plans will be produced by the *Contractor* or manufacturer which will indicate the level of product quality control to be applied. The CQP must be aligned to, and reference ISO 10005:2005 QMS, guidelines for quality plans and in compliance with the guideline in 240-105658000. The CQP will make reference to the *Contractor's* QMS Procedures to be used in this Contract. This plan will be reviewed by the *Project Manager*. The project team monitors that these plans are being implemented and that it is yielding the expected results through process and product verifications.

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.

3.5.2 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.

3.5.3 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 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.

3.6 Programming constraints

3.6.1 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

3.6.2 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.

3.6.3 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.

3.6.4 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:

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

3.6.5 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.

3.6.6 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

3.7 *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 *Contracto*r 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

3.8 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:

- 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.

3.9 Contract change management

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

3.10 Provision of bonds and guarantees

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

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

4 Engineering and the *Contractor*'s design

4.1 *Employer*'s design

See section 2.5 of this document.

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

Covered in detail in section 2 of this document.

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

4.3.1 Documentation Requirements

The *Contractor* ensures that the Technical Documents and Records Management Work Instruction, 240-76992014 is adhered to for all documentation requirements. The *Contractor* is responsible for the compilation and the supply of all documentation during the various project stages. The *Contractor* makes provision in their programme for the submission of design documentation. For consistency, it is important that all documents used within the project follow the same layout, style and formatting as described in the Technical Documents and Records Management Work Instruction, 240-76992014. Documents such as QCP's, Method Statements etc. that impact the project works to be approved by the *Employer* at least 3 working days prior to commencement of the works.
Each revision of a document or drawing shall be accompanied with a list of comments made by the *Employer* on previous revisions, if applicable. The responses/corrective actions taken by the *Contractor* to be recorded in a revision table contained in each drawing/document.
Documents and drawings to indicate the *Employer*'s unique identification number as allocated by the Employer. The *Contractor* may also have his own internal document or drawing number on the document or drawing.
The *Contractor* compiles a complete data book for all works performed during manufacturing, construction and commissioning. The data package to contain the following attributes as a minimum, where applicable:

- Design drawings used to execute the works
- Approved construction/installation method statement
- Approved QCP/ITPs
- Material certificates/data sheets for all components
- Test reports
- Calibration certificates
- Certificates of Completion (CoCs) or Professional Engineering Certificates (PECs)
- Operating and maintenance manuals
- Spares catalogue
- Storage, packing and transportation instructions

4.3.2 The Contractor shall ensure that documents have the following minimum attributes on the cover page:

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

The following additional attributes are important for technical documents:
- Package/System name/sub-system name

- Unit number
- Contractor name
- Contract number
- Plant identification codes

4.3.3 Format and Layout of Documents

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

4.3.4 Layout and Typography

Every document should comply with the following font specifications:

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

4.3.5 Document Headers

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

4.3.6 Naming of files

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

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

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

4.3.7 Documentation Submissions

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

a. Information Requirements

The *Employer* requires information and data from the *Contractor* for management and execution of the Contract as well as the operation, maintenance and support of the *works*. The *Contractor* to supply all information required in terms of the Contract including, whether or not specified in the Contract, all information necessary for:

1. Design reviews and the interface management of the *works*,
2. Quality assurance and control,
3. Operations, maintenance, training etc.

The scope of supply of information from the *Contractor*, to include the below document list, if applicable:

- **Typical Document Requirement List**

Document Group	Description of document type (includes information data sets)
General	Equipment arrangement drawings Piping & Instrument Diagrams (P&ID's) Engineering and procurement schedule Equipment list Isometric drawings Equipment specifications & data sheets Drawings and data for all equipment and material Installation, Operation, and Maintenance (IOM) Manuals Spare parts list Factory Acceptance Test (FAT) report
Quality Assurance	Quality assurance manual Quality control plans Quality control reports Weld summary index Material traceability certificates Manufacturing test reports Manufacturing Non-Conformance Reports (NCR's)
Civils & Structures	Building arrangement and floor layouts Structural drawings Architectural drawings Structural analysis and design report Foundation drawings Structural support drawings Access Platform/Walkway Drawings Professional Engineering Certificates from Professionally Registered Engineers

- **Typical Document Requirement List**

Document Group	Description of document type (includes information data sets)
Construction	Transportability study/report (including heavy haul study) Site management plan (QA, Safety, Environmental etc.) Construction schedule Site storage requirements for major equipment Construction test records Maintenance records for all equipment while stored on site Constructability report
Commissioning	Commissioning schedule Commissioning procedures Performance test procedure Performance test reports Field test reports and certificates
Operations	Operating procedures Plant operational documentation Plant tech specs Operating scenarios (for C&I control purposes)
Logistic Support	Maintenance concept Plant maintenance documentation ISI plan/program Spare parts assessment Plant RAM analysis Equipment access and removal paths assessment Fault finding diagrams
Training	Training plan Training manuals and instructions
Safety & Protection	Fire hazard analysis Waste management plan
Design Analyses	Reliability model and analysis Transient / Transition Analysis Flow dynamics analysis Thermo-hydraulic analysis Pipe Stress Analysis Maintainability analysis FMECA / FMEA analysis HAZOP analysis 3D model interference checks
Electrical	Motor list Electrical load list Circuit list Raceway list Single line diagram Protection schematic diagram Electrical load flow and fault studies report Cable block diagrams Cable schedule Cabling routing and cable racking layout diagrams Cable termination diagrams EMC and earthing standards report Earthing layout drawings Lighting layout drawings

• **Typical Document Requirement List**	
Document Group	**Description of document type (includes information data sets)**
C&I	Alarm and set-point schedule Instrument schedule Instrument data sheets Mechanical hook-up drawings Electrical hook-up drawings Cable Schedule Termination Schedules Junction Box GA and Internal Layout Junction Box and Instrument location drawings Instrument Stand GA Maintenance Manuals and procedures Operating and Control Philosophies Functional Logic diagrams Field device calibration certificates Level measurement installation report
CBMS	Alarm and set-point schedule Instrument schedule Instrument data sheets Equipment layout drawings Routing layout drawings Cable schedules Termination schedules Junction Box GA and Internal Layout Instrument Stand GA Maintenance Manuals and procedures Operating and Control Philosophies Field device calibration certificates Network architecture Fire risk assessments

b. **Drawings**

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

c. **Documentation Reviews**

The *Contactor* shall conduct design reviews in accordance to the *Employers* Design Review Procedure, 240-53113685 and participate in all design reviews as specified by the *Employer*. The *Employer* shall review and consolidate review comments for submitted documentation by the *Contactor*. The *Contactor* shall also make the necessary revisions or rectify noted issues highlighted on the documentation by the *Employer*. The *Consultant* must include the documentation reviews as part of the Design and Construction schedules and allocate appropriate timelines/durations for these activities.

d. Submission of the *Contractor’s* Design

- The *Contractor* submits all design documentation to the *Employer* for review. The documentation submitted to include all design elements i.e. drawings, calculations, reports etc.
- The *Employer* conducts a review of the design documentation. The *Employer* reserves the right to review any design in detail, where deemed necessary. The *Employer* accepts no accountability and liability due to the review of any designs.

- The *Contractor* is the Design Authority as defined in the Design Review Procedure, 240-53113685 for the *works*. The *Contractor* is responsible for following this design procedure and conducts all the design reviews as specified in this procedure.
- The following process will be followed for submission of documents:
  - The *Contractor* submits the documents/drawings to the *Project Manager*.
  - The *Project Manager* distributes the documents/drawings to all relevant parties within the *Employer's* project team to review
  - The *Employer's* project team reviews the documents/drawings and submit all comments or inputs to the *Project Manager*. The *Project Manager* submits the review comments to the *Contractor* for consideration.
  - If the *Employer* finds major deficiencies in the submitted documents/drawings, the *Contractor* revises the documents/drawings and resubmits to the *Project Manager*.
  - The *Employer* reviews the documents/drawings and if no major deficiencies are found, the *Contractor* organises a review session.
  - The *Employer* and the *Contractor* conduct a review.
  - If any fundamental errors are found in the review or further actions are required, the *Contractor* records all concerns raised and revises the documents/drawings accordingly.
  - The *Contractor* organises a review session once all documents/drawings have been revised
  - If no fundamental errors are found in the documents/drawings during the review session, the *Contractor* compiles the review minutes/report and submits to the *Employer*.
  - The *Employer's* project team reviews the *Contractor's* report/minutes. If the report/minutes are not acceptable, the *Contractor* revises the report/minutes and resubmits to the *Employer*.
  - The *Employer* accepts the *Contractor*'s documents/drawings once the report/minutes are accepted by the *Employer's* project team.

e. Acceptance of the *Contractor's* Design

The *Contractor* is to implement the following activities for design acceptance:

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

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

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

4.4 As-built drawings, operating manuals and maintenance schedules

4.4.1 As-built Drawings

a. 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.

4.4.2 Operating Manuals and Maintenance schedules

The *Contractor* shall prepare and submit operating and maintenance manuals for all supplied equipment under this contract. The manuals to provide a detailed/complete record of information relating to the proper and safe operation and maintenance of the supplied items. The *Contractor* to submit the documentation to the *Employer* for review and acceptance. The *Contractor* to submit theoperating and maintenance manuals prio**r** conducting any testing or commissioning activities. The manuals shall provide comprehensive information on the following but not limited to:

a. Equipment technical data
b. Detailed drawings of supplied equipment
c. Operating philosophy of supplied equipment
d. Prescribed maintenance schedule or routine maintenance procedures/instructions per manufacturer requirements at the recommended service intervals
e. Commissioning procedures

5 Procurement

5.1 People

5.1.1 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 *Contracto*r 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.

5.2 Subcontracting

5.2.1 Limitations on subcontracting

The *Contracto*r 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.

5.3 Plant and Materials

5.3.1 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

6 Construction

6.1 Temporary works, Site services & construction constraints

6.1.1 *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.

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

The generator area and the other units 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.

6.1.3 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.

6.1.4 Cooperating with and obtaining acceptance of Others

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

6.1.5 Publicity and progress photographs

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

6.1.6 *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.

6.1.7 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*.

6.1.8 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.

6.1.9 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.

6.1.10 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.
Covered in detail in section 2 of this document.

6.2 Completion, testing, commissioning and correction of Defects

6.2.1 Work to be done by the Completion Date

All work is to be done by the Completion Date.

On or before the Completion Date the *Contractor* shall have done everything required to Provide the Works at the Completion Date. The *Project Manager* cannot certify Completion until all the work has been done and is also free of Defects which would have, in his/her opinion, prevented the *Employer* from using the *works* and Others from doing their work.

6.2.2 Commissioning

Covered in detail in section 2 of this document.

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

Covered in detail in section 2 of this document.

6.2.4 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.

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

The Employer will provide access for correction of any defects identified during the agreed defects correction period.