Eskom	Scope of Work	Kusile Power Station

Title: **Kusile Power Station Professional Services Scope of Work for the design of Station Dirty Dam Level Indicators Project**

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1. Introduction

Kusile Power Station requires professional services for the installation of Station Dirty Dam (SDD) level indicators. The installation of level indicators in the dirty dam recovery system aims to enhance level measurement accuracy, improve operational efficiency, and ensure seamless integration with the existing Distributed Control System (DCS). A suitably qualified Consultant is required to undertake the design of these level indicators. The Consultant shall assume professional design liability and accountability for all the designs that will be provided to the Employer.

2. Supporting Clauses

2.1 Scope

2.1.1 Purpose

The objective of this document is to outline the requirements and specifications for the design of Station Dirty Dam Level Indicators.

2.1.2 Applicability

This document shall apply to Kusile Power Station.

2.1.3 Effective date

This document will be effective from the date of its authorisation.

2.2 Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

[1] 240-68099512 Tender and Contract Quality Requirements for QM 58 and Quality Requirements for ISO 9001 Standard (Form A).

[2] 240-107758130 Kusile Power Station Maintenance Execution Strategy for Balance of Plant Distributed Control System.

[3] ISO 9001 Quality Management Systems

[4] 240-53114002: Engineering Change Management Procedure

[5] 240-53113685: Design Review Procedure

[6] 240-53665024: Engineering Quality Manual

[7] National Environmental Management Act, Act 107 of 1998

[8] National Water Act, 1998 (Act No. 36 OF 1998)

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[9] 203-770: Kusile Concrete Specification

[10] 240-56364545: Structural Design and Engineering

[11] 240-57127951: Standard for the Execution of Site Investigations

2.2.2 Informative

[1] 32-727 SHEQ Policy.

[2] 35-681 - Eskom Plant Safety Regulations

[3] 146838-FS-00014 – Kusile Power Station Undergrounds and Foundations layout Rev 42

[4] 32 - 95 Environmental, Occupational Health and Safety Incident Management Procedure.

[5] 240-56355754 Field Instrument Installation Standard.

[6] 240-56355815 Junction Boxes and Cable Termination Standard.

[7] 240-53114002 Generation Engineering Change Procedure.

[8] 240-93576498 KKS Coding Standard.

[9] 240-71432150 Plant Labelling Standard.

[10] 240-109607332 Eskom Plant Labelling Abbreviation Standard.

[11] 240-110710597 Kusile Power Station Configuration Management Plan.

[12] 240-150642762 Generation plant safety regulations

[13] 240-56062752 Medium Voltage Miniature Substations for Systems with Nominal Voltages of 3.3kV 6.6kV 11kV and 22kV Standard.

[14] 240-86973501 Eskom Engineering Drawing Standard.

2.3 Definitions

Term	Definition
Consultant	Service provider contracted for supplying specific service to Eskom, Kusile Power Station.
Employer	Any person appointed in writing by Eskom as the delegated *Employer* in terms of the provisions of the Act, (normally the Power Station Manager)
Services	Services on a project for which the Contractor is engaged
Subconsultant	Party employed by the Consultant for specialized work (i.e., Electrical, Mechanical and Civil and Structural installations)
KKS	Is a code used to clearly identify systems and components in a power plant according to process functions, points of installations and structures. "Kraftwerk-Kennzeichen-System (KKS)"
Plant	Any structure, machinery, apparatus, or equipment which does not fall within the scope of the operating regulations for high Voltage systems, and excludes, mobile, portable lifting equipment, domestic circuits, and tools.

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Term	Definition
Controlled Disclosure	Controlled disclosure to external parties (either enforced by law, or discretionary).

2.4 Abbreviations

Abbreviation	Explanation
C&I	Control and Instrumentation
DCS	Distributed Control System
GA	General Arrangement
HMI	Human Machine Interface
IP	Ingress Protection
ISO	International Organisation for Standardisation
ITP	Inspection Test Plan
JB	Junction Box
NCR	Non-Conformance Reports
NGL	Natural Ground Level
OEM	Original Equipment Manufacturer
OTS	Operating Technical Specification
QA	Quality Assurance
QC	Quality Check
QCP	Quality Control Plan
QMS	Quality Management System
SANS	South African National Standard
SOW	Scope of Work

2.5 Roles and Responsibilities

2.5.1 Consultant

The Consultant shall ensure the following:

a) Review the contract in detail to fully understand the design scope, technical requirements, and deliverables.

b) The Consultant shall complete the scope of work as outlined in this document.

c) The Consultant shall provide proof of competence of previous works conducted like the requested services.

d) The Consultant shall submit both electronic and hard copy versions of all required documentation e.g. design reports, drawings (editable soft copy of drawings) and calculations.

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e) The Consultant shall submit all relevant and necessary documentation requested by the Employer e.g. compliance certifications etc.

f) The Consultant shall observe all relevant regulations, standards of professional conduct and industry norms in relevant South African National Standards, and standards recommended by relevant professional associations.

g) The Consultant shall demonstrate skills and care generally used by professionals providing services like the required services.

2.5.2 Employer

The Employer shall ensure the following:

- Provide clarity on the scope of work to the Consultant as and when required.
- Conduct design reviews and acceptance of the Consultant's designs.
- Ensure that the Consultant signs the contract and understands the scope, deliverables, timelines, and payment terms.
- Provide all necessary project documentation, including technical specifications, design guidelines, and any regulatory requirements.
- Ensure compliance with legal, safety, and environmental regulations.

2.5.3 Related/Supporting Documents

N/A

2.6 Process for Monitoring

N/A

3. Description of the Works

3.1 Employer's design

3.1.1 Executive Overview

The Station intends to appoint a suitably qualified external Consultant for engineering professional services to undertake the design of Station Dirty Dam level indicators to meet the end-user's needs. The Consultant shall take full liability for all their designs and Services provided to the Employer.

The work includes but not limited to the following:

- **Architectural design**
    - Schematic designs and design concepts
- **Site investigations**
    - Surveys

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- Geotechnical investigations
- Underground services detection

- **Civil and Structural design**
  - Structural design for equipment civil support structure
- **Electrical designs**
  - Small power and lighting
  - Power Supply
  - Earthing and lightning protection
- **Control and Instrumentation Design**
  - Instrumentation equipment design

3.1.1.1 Codes and Standards

The scope of Services shall be done in accordance with SANS standards, prescribed Eskom standards and any other applicable codes of practice, specifications, and regulations. Reference to standards or manuals of any society, organization, or association, whether such reference is specific or by implication, shall mean the latest standard, manual, or code in effect at the time of the contract award. The Consultant adheres to the latest editions of the listed standards (where applicable) and normative references. If there is any contradiction within the codes and standards, the Consultant liaises with the Employer for clarification. The Consultant notes that the provided lists are not all-inclusive and do not relieve the Consultant from complying with all applicable design codes.

Table 1: Civil & Structural Standards

Definition	Explanation
Applicable Standards	
SANS 10313	Protection of structures against lightning
SANS 2001 Series	Standardised Specification for Construction Works
SANS 1200 Series	Standardised Specification for Civil Engineering Construction ‘
SANS 3001 Series	Civil Engineering Test Methods

Table 2: Electrical Standard

Definition	Explanation
Applicable Standards	
240-55714363	Coal Fired Power Stations Lighting and small power installation standard
240-93576498	KKS Coding Standard
240-56227443	Requirements for Control and Power Cables for Power Stations Standard
240-56356396	Earthing and Lightning Protection Standard
OHS Act 85 of 1993	Environmental Regulations for Workplace, 1987 (Section 3, Lighting)

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Table 3: C & I Standards

Definition	Explanation
Applicable Standards	
240-55714363	Coal Fired Power Stations Lighting and small power installation standard
240-93576498	KKS Coding Standard
240-56227443	Requirements for Control and Power Cables for Power Stations Standard
240-56356396	Earthing and Lightning Protection Standard
OHS Act 85 of 1993	Environmental Regulations for Workplace, 1987 (Section 3, Lighting)

Table 4 Configuration Management standards

Definition	Explanation
Applicable Standards	
240-131050729	Hybrid Coding Standard
240-109607732	Eskom Plant labelling Abbreviation Standard
240-109607736	Eskom KKS Key part Standard
240-86973501	Drawing Standard
 240-76992014	Technical Document and Record Management
240-51093273	Engineering Change Management or Control

Site Location

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The Kusile Power Station site is located approximately 37km northwest of eMalahleni in the Mpumalanga Province. The site is accessed from the R686 road between highways, N4 and N12. The *Employer* has identified potential sites for the new building facilities, for consideration. The *Consultant* shall be responsible for evaluating the suitability of the sites for the intended Services and Works. The *Consultant* shall identify alternative sites, where deemed necessary, and the building sites shall suit project objectives and requirements.

3.2 Scope of Work

3.2.1 Description of the Services

The scope of Services entails the following:

The *Consultant* provides engineering design services with the Engineering Profession Act, 46 of 2000, Guideline for Professional Fees: Scope of services and Tariff of Fees for Registered Persons:

- Design of the water level indicator instrumentation
- Design of the cantilever civil support structure
- Power supply and lighting

The *Consultant* appoints and manages his *Subconsultants* for the scope of Services. The *Consultant* co-ordinates the work of discipline specific design *Subconsultants* as relevant and satisfies the relevant requirements of the National Building Regulation, Act 103 of 1977, amongst others. The *Consultant* co-ordinates interfaces to ensure design integration for all components of the Works.

Inception

a) The *Consultant* liaises with the project team and stakeholders to assess and establish the user needs and client requirements.

b) The *Consultant* establishes the need for specialist advice, studies, tests, investigations, and surveys relevant to the scope of Services, including the appointment of such specialist resources and services.

c) The *Consultant* performs and co-ordinates all studies, tests and surveys required for the scope of works. The Consultant collates outputs of specialist's studies, surveys, and advices on implications of the findings. The findings are reported and communicated to the Employer.

d) The *Consultant* assesses the existing infrastructural elements to ensure integration between existing and proposed new works.

e) The *Consultant* obtains, investigates, and collates available data and drawings relating to the scope of Services.

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3.2.2 Concept and Viability

a. The *Consultant* develops the concept designs and related documentation in accordance with the scope requirements. The *Consultant* ensures conformance with the user and regulatory requirements as well as the relevant standards. A cost benefit analysis for each concept design option is performed by the *Consultant*.

b. The *Consultant* manages and integrates the concept documentation for presentation and submission to the *Employer* for approval.

c. The *Consultant* conducts design reviews in accordance with the *Employer's* Design Review Procedure, 240-5311685 for his designs in collaboration with the project team.

d. The *Consultant* establishes the life cycle and project related cost estimates associated with his designs.

3.2.3 Detail design development

a. The *Consultant* develops the detail designs and related documentation as per the scope requirements. The *Consultan*t submits his detailed designs to the *Employer* for acceptance.

b. The *Consultant* incorporates the Employer's detailed requirements into the design.

c. The *Consultant* incorporates his *Sub-Consultant's* designs and requirements into the design.

d. The *Consultant* performs temporary and permanent design changes necessary to complete his designs. The *Consultant* submits the design changes to the *Employer* for review and acceptance.

e. The *Consultant* conducts design reviews in accordance with the Employer's Design Review Procedure, 240-5311685 in collaboration with the project team.

f. All design reports, working or construction drawings prepared by the *Consultant*, are signed off by an ECSA Professionally registered Technologist/Engineer who takes full professional accountability and liability for the designs.

g. The *Consultant* prepares detailed specifications for all components of Works for inclusion in the construction/installation scope of works. The *Consultant* defines amongst others, the performance, quality, operating and maintenance requirements etc. of the required services.

h. The *Consultant* prepared detailed construction/installation cost estimates.

i. The *Consultant* prepares cost estimates of proposed variations for the Work.

3.2.4 Additional services of the project

a. The *Consultant* reviews design data prepared by others, that interface or may impact his designs, for purposes of delivering sound engineering designs.

b. The *Consultant* performs all required topographical and environment surveys, analyses, tests and investigations necessary to carry out the Services.

c. Preparing record drawings related to alterations to works.

3.2.5 Boundary of the Services

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The extent of the engineering professional services includes the following:

a. The *Consultant* shall design the following but not limited to:
    - Radar Water Level Indicators Instrumentation
    - Power Supply and Lighting
    - Cantilever Civil Support Structure

b. The *Consultant* shall specify the required equipment requirements and specifications for their designs. Spatial design requirements shall be considered in the designs.

3.2.6 Key Professional Personnel required for the services (suggestion)

The key project resources that are required in the management and delivery of the project include the following but not limited to:

- Structural or Civil Engineer/ Technologist, professionally registered with ECSA
- Geotechnical engineer, professionally registered with ECSA
- Electrical Engineer/ Technologist, professionally registered with ECSA
- Control and Instrumentation Engineer/Technologist, professionally registered with ECSA with related experience.
- Professional Land Surveyor professionally registered with the SAGC

3.3. Engineering Scope

3.3.1 Civil & Structural Scope

- The *Consultant* shall conduct site visits and assessments of the site where the support structure for the level indicators is required. As part of the assessment, the *Consultant* will review as-built drawings and geotechnical reports. The *Consultant* must conduct their own geotechnical analysis and surveys, for the purpose of their designs, and must not rely solely on Eskom's documents for detailed designs.
- The *Consultant* conducts a geotechnical investigation to characterize the soil condition/properties of the proposed project site, to permit acceptable designs and construction of the Works. The geotechnical investigation must be used in the design of the required infrastructure. Any findings that may have significant impact on the Contractor's design must be discussed with the Employer.
- The *Consultant* conducts topographical and environmental surveys necessary to complete his designs for the proposed project sites. The survey must be used in the design of the required infrastructure. Any findings that may have significant impact on the Contractor's design must be discussed with the Employer.

3.3.2 Electrical Scope

The scope of Services includes the following:

a. Electrical Supply:

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- Provisions are made for sufficient power supply to meet the demands of the level indicator equipment.
- The *Consultant* coordinates with electrical *Contractors* to establish designated supply points near designated plant area.

b. Earthing Systems:

- Implementation of effective earthing systems to protect personnel and equipment from electrical faults and lightning strikes.
- Utilization of high-quality materials and techniques to ensure proper grounding throughout the facility.

c. Cable Routing:

- Planning and implementation of efficient cable routing strategies to minimize interference, maximize reliability, and ensure ease of maintenance.
- Utilization of cable racks, trunking, conduits, and appropriate labelling to organize and protect electrical cables.

d. Design and Planning:

- Develop detailed electrical plans in coordination with engineering teams to ensure seamless integration with buildings modifications.

3.3.3 Control & Instrumentation Scope

3.3.3.1 Pre-Installation Activities

a. Site Survey & Assessment:

- The *Consultant* must conduct a site inspection to determine suitable mounting locations
- The *Consultant* must assess proposed structural support design and environmental conditions (e.g. humidity, temperature, interference) within a proposed project site.
- The *Consultant* must identify existing equipment infrastructure and integration points.

b. Engineering & Design:

- The *Consultant* must develop engineering drawings and mounting arrangements.
- The *Consultant* must verify power supply requirements and communication protocols (e.g. HART).
- DTM files to be given for configuration through the DCS.
- The Consultant must ensure radar level indicators compatibility with dirty dam conditions (e.g., slurry).

There is an existing Level Monitoring System in the station's dirty dam pump house inside Kusile Power Station. The system is based on the pressure transmitters which is challenged with inaccurate readings. The modifications to be done under the project may impact the existing system, which will be de-commissioned after completion of Radar Level Indicator project. The Level Monitoring System covers real-time monitoring, data logging, and integration with the Distributed Control System (DCS).

The following are the Consultant's duties:

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The Consultant designs in detail the below listed systems to ensure monitoring, operation, and administration capability from the new level monitoring system. In cases where newer technology is available which the *Consultant* proposes for use, the *Consultant* states this clearly in the design:

a. Radar Level Indicator System will be used for monitoring of water levels in the dirty dam. The system is to be integrated with the existing DCS for real-time data visualization and control.

b. A communication interface for transmitting level data to the control room. This will be based on the industrial communication protocols such as HART.

c. An alarm system configuration that triggers alerts for high and low-level thresholds, integrated into the existing DCS alarm management system.

d. A configuration for data logging and reporting system for historical analysis and trend monitoring.

e. Network infrastructure for integrating all sub-systems (Switches, cabling, etc.).

f. Familiarizes themselves with the existing level monitoring system in the areas where modifications will be made under this project.

g. Identifies and collects all drawings required to perform the work.

h. Ensures that changes to the existing installations do not lead to non-conformance of the installations to applicable design standards, e.g., ensuring proper sensor positioning for accurate level detection.

i. Prescribes construction/installation methodology for their design to maintain adherence.

Sub-Consultant Services

- The *Consultant* submits the name of each proposed *subconsultant* to the *Employer* for acceptance. The *Consultant* does not appoint a proposed *Subconsultant* until the *Employer* has accepted him.
- The *Consultant* submits the proposed conditions of contract for each subcontract to the *Employer* for acceptance unless the NEC contract is proposed, or the *Employer* agreed that no submission is required. The *Consultant* does not appoint a *Subconsultant* on the proposed *subconsultant* conditions submitted, until the *Employer* has accepted him.

3.3.4 Engineering and the Consultant's Design

3.3.4.1 Employer's design

The extent of the *Employer's* design is as described in the *Employer's* drawings. The *Employer* will make available all the available and required native files to the *Consultant* to enable completion of his designs, design reviews and updating of the *Employer's* drawings.

Parts of the Works which the Consultant is to design

Responsibility for Design

a. The *Consultant* provides designs that are fit for purpose and in accordance with relevant standards and regulations.

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b. The *Consultant* assumes full design accountability and liability for his designs.

c. An ECSA Professionally Registered Engineer signs off all designs, design reports and construction design drawings, prepared by the *Consultant* and his *Subconsultant.*

d. The *Consultant* is responsible for the design of all temporary Works required for implementation.

e. Where the *Consultant* requires additional information to design certain components of the Works, the *Consultant* notifies the *Employer* of the requirement/s timeously.

f. The *Employer* may review, but will not accept, the *Consultant's* designs if there is non-compliance discovered. The responsibility to ensure compliance remains with the *Consultant.*

g. All changes required for construction or manufacturing, that impact or change the *Employer's* design is redlined on drawings by the *Consultant*. The redline drawings include notes for clarification purposes. The *Consultant* submits the redlined drawings to the *Employer* for acceptance.

h. The *Consultant* is mandated in terms of Construction Regulations 2014: Duties of Designer, 6(1) g to fulfil the duties described therein or the detailed designs done by the *Consultant*. Any risks associated with the *Consultant's* design is highlighted to the *Employer* together with mitigation measures.

i. The *Consultant* submits design reports, for his all his designs, to the *Employer* for his acceptance. Design reports to include the following as a minimum:

- Design philosophy
- Assumptions made with regard to the design.
- Design criteria/ parameters used.
- List of applicable codes and literature that was used in the design.
- Design results and calculations for all elements.
- Software input and output files including design models.
- Material used; and
- Submit Operation and Maintenance Manuals, where applicable.

j. Submit multidisciplinary detailed design drawings for the full scope of work, capturing all necessary details.

3.3.5 System Interface & Design Integration

a. The *Consultant* is responsible for all system interfaces which form part of the project scope. The *Consultant* caters for all the identified interfaces, taking into consideration all packages required. The *Consultant's* design considers all existing services ensuring no clashes with existing infrastructure.

b. The *Consultant* is responsible for all interfaces that form part of the scope and shall cater for these in his design.

c. The *Consultant* notes that the project areas have existing services. The *Consultant* shall avoid any clashes with existing services as well as cater for this in this design.

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3.3.6 Other Requirements of the Consultant's Design

3.3.6.1 Construction & Commissioning Monitoring

The *Consultant* provides construction and commissioning supervision in accordance with Level 4 of the ECSA Guideline Scope of Services and Tariff of Fees for Registered Persons [Engineering Profession Act, 2000, (Act No. 46 of 2000).]. The Works include the provision of on-site personnel during construction, as deemed necessary by the *Consultant.* These services shall be required for the duration of the Works. The duties of the *Consultant* are detailed below but not limited to the following:

- Perform technical oversight of the project i.e., respond to technical queries during construction and commissioning activities including but not limited to the review of construction work procedures, quality control plans, material approvals, survey approvals, requests for information, concessions, data books etc.
- Monitor construction and commissioning activities to ensure compliance with the project scope requirements.
- Management of project interfaces etc.
- Site Supervision

The *Consultant* provides a full-time construction supervision team on site for construction and commissioning activities. The following key responsibilities shall apply:

- Supervise and report on *contractor's* performance
- Should 24-hour construction monitoring be required, additional resources will be required to manage the workload
- Comply to all *Employer* and site related governance and safety, health, environment, risk requirements.

Use of the Consultant's design

- The *Consultant*, as specified in this Works Information, supply all design documentation for the Works to the *Employer.* The *Consultant* notes that all design documentation to the *Employer* become the Property of the *Employer* upon completion of the Works. The *Consultant* notes that the Employer has total rights to use the *Consultant's* design, as the *Employer* requires.

3.3.7 Documentation Requirements

- The *Consultant* ensures that the Technical Documents and Records Management Work Instruction, 240-76992014 is adhered to for all documentation requirements. The *Consultant* is responsible for the compilation and supply of all documentation during the various project stages. The *Consultant* 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.

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- 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 response/corrective actions taken by the Consultant to be recorded in a revision table contained in each drawing/document.
- Document and drawings to indicate the *Employer's* unique identification number allocated by the *Employer.* The *Consultant* may also have his own internal document or drawing number on the document or drawing.

Document Identification

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

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

The following additional attributes are important for technical documents:

- Package/System name/subsystem name
- Unit number
- Consultant name
- Contract number
- Plant identification codes

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.

a. Layout and Topography

Every document should comply with the following font specifications:

- Font color: Black

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- Main Headings Font Type: Arial, Bold, Capital Letters
- Main Heading Font Size: 12pt
- Subheadings Font Type: Arial, Bold, Title Case
- Subheadings 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: Centered page numbers (about 0.5 inches from bottom)
- Indentations: Standard tab for all paragraphs (about 0.4 to 0.5 inches)

Document Headers

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

Naming of files

The Consultant 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)

Documentation Submissions

- The *Consultant'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 *Consultant* is provided with the latest revisions of the mentioned documents.

Information Requirements

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The *Employer* requires information and data from the *Consultant* for management and execution of the contract. The *Consultant* shall supply all information required in terms of the contract including, whether specified in the contract, all information necessary for:

- Design reviews and the interface management of the works,
- Quality assurance and control,

The scope of supply of information from the Consultant, 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 Diagram (P&ID's) Equipment list. • Isometric drawings • Drawings and data for all equipment and material
Civil and Structures	• Layout Drawings • Elevation and section drawings 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
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
Safety & Protection	• Fire hazard analysis Waste management plan

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Design Analyses	• Reliability model and Flow dynamics analysis • Thermo-hydraulic analysis Pipe Stress Analysis Maintainability analysis FMECA/FMEA analysis HAZOP analysis • 3D model interference checks
Electrical	• 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 • Cable routing and cable racking layout diagrams Cable termination diagrams • EMC and earthing standards report Earthing layout diagrams • Lighting layout drawings
Control and Instrumentation	• 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

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3.3.8 Drawings

The creation, issuing and control of all Engineering Drawings shall be in accordance with 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 *Consultant* 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.

Submission of the Consultant’s Design

a. The *Consultant* submits all design documentation to the *Employer* for review. The documentation submitted to include all design elements i.e., drawings, calculations, reports etc.

b. 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.

c. The *Consultant* is the Design Authority as defined in the Design Review Procedure, 240-53113685 for the project scope. The *Consultant* is responsible for following this design procedure and conducts all the design reviews as specified in this procedure.

d. The following process will be followed for submission of documents:

- The *Consultant* submits the documents/drawings to the *Employer.*
- The *Employer’s* representative 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 *Employer’s* representative. The *Employer’s* representative submits the review comments to the *Consultant* for consideration.
- If the *Employer* finds major deficiencies in the submitted documents/drawings, the *Consultant* revises the documents/drawings and resubmits to the *Employer’s* representative.
- The *Employer* reviews the documents/drawings and if no major deficiencies are found, the *Consultant* organises a review session.
- The *Employer* and the *Consultant* conduct a review.
- If any fundamental errors are found in the review or further actions are required, the *Consultant* records all concerns raised and revises the documents/drawings accordingly.
- The *Consultant* 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 *Consultant* compiles the review minutes/report and submits to the *Employer.*

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- The *Employer's* project team reviews the *Consultant's* report/minutes. If the report/minutes are not acceptable, the *Consultant* revises the report/minutes and resubmits to the *Employer*.
- The *Employer* accepts the *Consultant's* documents/drawings once the report/minutes are accepted by the *Employer's* project team.

Acceptance of the Consultant's Design

The *Consultant* is to implement the following for design acceptance:

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

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

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

KKS Classification System

Plant Codification

- The KKS system shall be used by the *Consultant* for classifying and designating both plant and their associated documents (including labelling or tagging of the plant items). All technical documentation as per "Technical documentation classification and designation standard – 240-54179170" shall contain a KKS code as part of the documentation identification relevant to the plant equipment.
- All plant (Electrical, C&I and Civil) shall be coded up to KKS breakdown level 3 (components level). The KKS code shall contain and comply with break down levels: Level 1, break down; Level 2 and breakdown Level 3, in compliance with Eskom Hybrid Coding Standard [240-131050729]. Omission or any deviation of/from any break down level from levels shall not be permitted without any deviation approvals from the *Employer*.
- The system shall be applied from the concept stage until project closeout. The rules specified in the VGB guidelines will be used but all rules specified in Eskom documents will take precedence.
- Detailed nameplate or label list with the service legends and including the KKS Code shall be prepared by the *Consultant* and submitted to the *Employer* for review and comment before commencing manufacture of the labels. All maintainable plant equipment and components shall be labelled including pipework.
- The rules for applying the KKS and coding are contained in the Eskom Standard 240-93576498 and in the publication KKS power plant classification (B105e) 5th Edition 2003 published by Verlag VGB Power Tech Service GmbH (Essen), and the KKS Applications: Guideline and explanations A, B1-4 (B106e).
- The *Consultant* shall use Eskom –specific interpretations of the KKS standards, which will be reviewed and agreed on after Contact Award. The following variations relating to 240-93576498 are noted.

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- Breakdown level 3 component code -> not used in P&ID's and PFUP's, only used by control hardware supplier.
- Breakdown level 0: will be shown as a general remark on the P&ID not on the individual KKS number.
- F0-level is not used; FN level is free -> no general decoding system.

- The *Consultant* shall code all plant within scope of supply according to the KKS Classification System to Breakdown Level 3 where possible. The relevant KKS codes thus allocated shall appear on all plant related documentation, drawings, lists and correspondence.
- The *Consultant* shall code all plant within scope of supply according to the KKS Classification System to Breakdown Level 3 where possible. The relevant KKS codes thus allocated shall appear on all plant related documentation, drawings, lists and correspondence.
- The *Consultant* shall be responsible for ensuring the accuracy, completeness, and consistency of the designations in all documents. This applies both to designations within documents (plant designations) and of Documents (documents designations). The *Consultant* shall submit these for the *Employer's* approval.
- A list of the KKS designations allocated shall be drawn up by the *Consultant* for each scope of delivery. Methods of KKS designation, list formulation and submission format shall be proposed by the *Consultant* and agreed by the *Employer.*

Deliverables

The *Consultant* is required to provide professional engineering services. The *Consultant* submits the following deliverables to the *Employer* for acceptance:

a. Geotechnical investigation and survey reports
b. Detailed design reports for the entire project scope. Reports to be signed off by ECSA Professionally Registered Engineers /Technologists
c. Approved working drawings for the entire project scope.
d. Design drawings to be signed off by ECSA Professionally Registered Engineers
e. Technical Specification for construction scope of *Works*
f. Bill of Quantities for entire project scope
g. All construction related documentation as detailed in this scope document.

4. Acceptance

This document has been seen and accepted by:

Name	Designation
Mauritz van der Bank	Chief Technologist Engineering
Puseletso Ndlovu	C&I Engineering Manager
Bongumusa Bungane	Chemical Services Manager
Chuma Xayimpi	Design and Specification Manager (Acting)
Mohapi Mphirime	Electrical Engineering Manager

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Name	Designation
Busi Nkomo	Auxiliary Engineering Manager
Grace Olukune	Engineering Group Manager
Lesiba Kgobe	Environmental Manager
Thobile Yonga	Manager OCC Hygiene

5. Revisions

Date	Rev.	Compiler	Remarks
February 2024	1	S. Mtambo	This document was compiled to provide requirements for the Kusile Power Station SDD Level Indication project.

6 Development Team

The following people were involved in the development of this document:

a) Sibonelo Mtambo
b) Keoagile Kgaladi
c) Vely Sondezi

7.Acknowledgements

a) Mauritz van der Bank

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Appendix A: Kusile Power Station OHS Process Flow for Tender

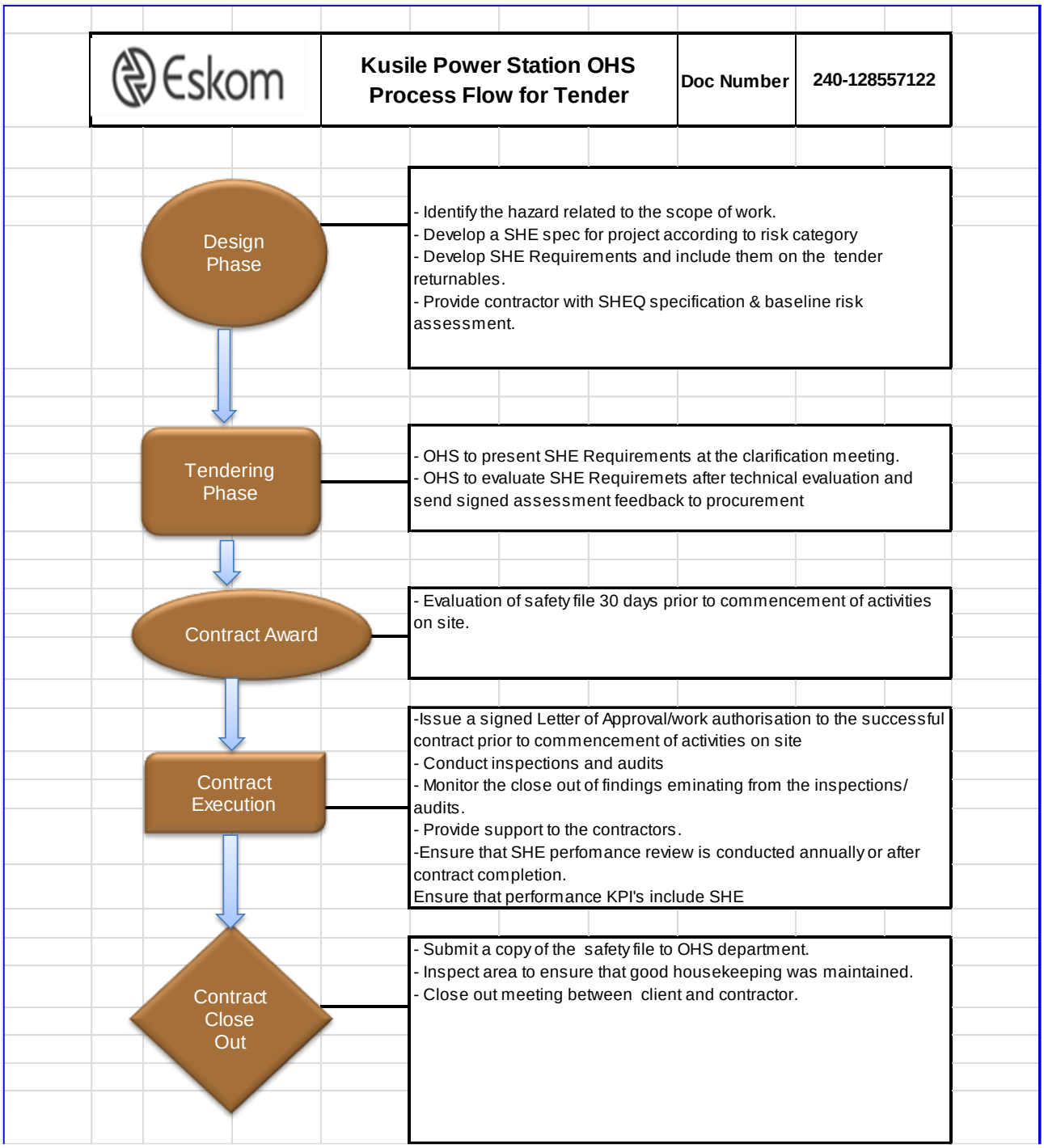

Figure 1: Kusile Power Station OHS Process Flow for Tender.

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