

	<p style="text-align: center;"><b>Scope of Work</b></p>	<p style="text-align: center;"><b>Kusile Power Station</b></p>
--	---	--

Title: **Professional Services – Warehouse Facility Upgrades at Kusile Power Station**

Document Identifier: **KUS-20250607**

Alternative Reference Number: **N/A**

Area of Applicability: **Kusile Power Station**

Functional Area: **Engineering**

Revision: **1**

Total Pages: **49**

Next Review Date: **N/A**

Disclosure Classification: **Controlled Disclosure**

Compiled by	Supported by	Functional Responsibility	Authorized by
			
<p><b>Lelethu Thipa</b> Civil Engineer</p>	<p><b>Keoagile Kgaladi</b> Civil Engineer</p>	<p><b>Sibusisiwe Nkomo</b> Auxiliary Plant Engineering Manager</p>	<p><b>Fulufhelo Netshiongolwe</b> Engineering Group Manager (Acting)</p>
<p>Date: 13/08/2025</p>	<p>Date: 13/08/2025</p>	<p>Date: 13.08.2025</p>	<p>Date: 13-08-2025</p>

Content	Page
1. Introduction .....	5
2. Supporting Clauses.....	5
2.1 Scope .....	5
2.1.1 Purpose .....	5
2.1.2 Applicability .....	5
2.1.3 Effective Date .....	5
2.2 Normative/Informative References .....	5
2.2.1 Normative .....	8
2.2.2 Informative.....	8
3 Description of the <i>works</i> .....	8
3.1 Executive Overview.....	8
3.1.1 Warehouse Building System Defects and Limitations .....	8
3.2 <i>Employer's</i> objectives and purpose of the <i>works</i> .....	9
3.3 Interpretation and terminology .....	9
3.4 Roles and Responsibilities.....	10
3.4.1 <i>Consultant</i> .....	10
3.4.2 <i>Employer</i> .....	11
3.5 Boundary of Scope of <i>Works</i> .....	11
3.6 Site Description.....	12
3.7 General Scope of <i>Works</i> .....	13
4 Engineering and the Consultant's design .....	33
5 Constraints on how the Consultant performs the service.....	35
6 Project Deliverables .....	43
7 Acceptance .....	43
8. Revisions .....	47
9. Development Team.....	47
10. Acknowledgements.....	47

## Figures

Figure 1: Warehouse Location.....	10
Figure 2: Proposed Site Location of the Security Guardhouse.....	13
Figure 3: Power Supply with Essential Loads Back-up .....	18
Figure 4: Kusile CBMS High Level Architecture.....	24
Figure 5: High Level Architecture for ACS.....	27

**CONTROLLED DISCLOSURE**

**Tables**

Table 1: Employer Standards.....	4
Table 2: Abbreviations .....	8
Table 3: C&I Standards .....	25

**CONTROLLED DISCLOSURE**

When downloaded from the document management system, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorized version on the system. No part of this document may be reproduced in any manner or form by third parties without the written consent of Eskom Holdings SOC Ltd, © copyright Eskom Holdings SOC Ltd, Reg No 2002/015527/30

## **1. Introduction**

Facility assessments point to deficient building systems and infrastructure at Kusile Power Station’s main warehouse building. The *Employer* intends to render professional services to address the identified deficiencies to maintain regulatory compliance and to ensure the continued safe use of the building.

## **2. Supporting Clauses**

### **2.1 Scope**

#### **2.1.1 Purpose**

The purpose of this document is to outline the project specifications for the mentioned scope of services at Kusile Power Station.

#### **2.1.2 Applicability**

This document shall to Kusile power Station

#### **2.1.3 Effective Date**

This document shall be effective from the date of its authorization.

### **2.2 Normative/Informative References**

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

**Table 1: Employer Standards**

<b>Code</b>	<b>Description</b>
<b>Applicable Standards</b>	
240-4332798	Engineering policy
240-5311685	Design Review Procedure
240-53114026	Engineering Change Management Procedure
240-71432150	Plant Labelling Standard
240-93576498	Coding Standard

### **CONTROLLED DISCLOSURE**

240-76992014	Project/Plant Specific Technical Document and Records Management Work Instruction
240-65459834	Gx Projects Documentation Deliverable Requirements Specification
240-57127953	Execution of Site Preparation and Earthworks Standard
240-57127955	Geotechnical and Foundation Engineering Standard
240-912523315 240-76368574	Standard for Bullet-Resistant Guard Huts High Security Mesh Fencing Standard
203-1239	Kusile Power Station Conceptual Architectural Design Specifications for Structures and Other Buildings, Rev 2
240-107981296	Constructability Assessment Guideline Standard
240-56364545	Structural Design and Engineering Standard
203-770	Kusile Specification for Structural Concrete
240-84418186	Road Specification Manual
240-86973501	Engineering drawing Standard
240-66920003	Documentation Management Review and Handover Procedure for Gx Coal Projects
203-103437	Technical Document Submission and Review Work Instruction
203-770	Kusile Power station specification for structural concrete
240-106365693	Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings
240-76368574	High Security Mesh Fencing
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
240-55714363	Coal Fired Power Stations Lighting and small power installation standard
BS EN 62676-4	Video Surveillance Systems for use in Security Applications
240-91190304 -	Specification for CCTV Surveillance with Intruder Detection
SANS 10222-5	Electrical Security Installations Part 5: CCTV installations

**CONTROLLED DISCLOSURE**

---

240-102220945	Specification for Integrated Access Control System (IACS) for Eskom sites
240-86738968	Specification for Integrated Security Alarm System for Protection of Eskom Install and Subsidiaries
240-55410927	Cyber Security Standard for Operational Technology
240-78980848	Specification for Non-Lethal Energized Perimeter Detection System (NLEPDS) for Protection of Eskom Installations and its Subsidiaries
240-64720986	Emergency Preparedness Public Address System – For Large Area Deployment
240-131050729	Hybrid Coding Standard
240-109607732	Eskom Plant labelling Abbreviation Standard
240-106365693	Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings
240-91190304	Specification for CCTV Surveillance with Intruder Detection
240-56356396	Earthing and lightning Protection Standard.
240-91190304	Specification for integrated security alarm system for protection of Eskom installations and its subsidiaries
32-894	Eskom Server Rooms and Data Centres Standard
240-102547991	General Technical Specification for HVAC Systems Standard
240-56355731	Environmental conditions for process control equipment used at Power Stations
CIBSE	Commissioning Code A: Air Distribution Systems
CIBSE	Commissioning Code B: Boilers
CIBSE	Commissioning Code C: Automatic Controls
CIBSE	Commissioning Code M: Commissioning Management
CIBSE	Commissioning Code R: Refrigeration
CIBSE	Commissioning Code W: Water Distribution Systems
ASHRAE 15	Safety Code for mechanical refrigeration
ASHRAE 62	Ventilation for acceptable indoor air quality

**CONTROLLED DISCLOSURE**

ASHRAE55	Thermal environmental condition for human occupancy
SANS10147	Refrigeration systems including plants associated with air-conditioning systems
240-54937450	Fire Protection and Life Safety Design Standard
240-54937439	Fire Protection Detection Assessment Standard
240-54937454	Inspection, Testing and Maintenance of Fire Protection Systems Standard
SANS10400-T	National building regulation part T
SANS10400-	National building regulation part W
W 240-	Fire Detection and Life Safety Design Standard
56737448	

### 2.2.1 Normative

N/A

### 2.2.2 Informative

[1] 36-681: Eskom Plant Safety Regulations

[2] 474-58 (Rev1): Document and Records Management

[3] 240-105658000: Supplier Quality Management Specification

## 3 Description of the services

### 3.1 Executive Overview

The *Employer's* main warehouse building was designed for temporary use during construction of the Kusile Power Station site. The facility was subsequently repurposed as an additional storehouse for the power station site. Facility assessments point to deficient building infrastructure and systems that pose a safety risk. As such, the *Employer* requires a consultant to render professional services to address the detailed flaws.

The *Consultant* notes that the engineering designs for the building and its associated systems do not exist.

The project services include the following but not limited to:

- Site feasibility/evaluation study and planning services i.e. site and route locations etc.
- Surveying and setting out works for the scope elements
- Condition assessments and analysis of existing works i.e. structural assessment and analysis, subsurface utility mapping etc.

**CONTROLLED DISCLOSURE**

- Geotechnical services i.e. site investigations, earthworks and foundation design etc.
- Architechural design including restoration and renovation services on existing building
- Civil engineering design for warehousing & general building structures i.e. stormwater design, sanitary drainage, subsurface utility designs
- Structural engineering design for warehousing & general building structures; steel, masonry and concrete design, structural alterations and restoration
- Wet services design i.e. potable and fire water supply & distribution
- Heating, Ventilation and Air Conditioning (HVAC) system evaluation and design
- Electrical design i.e. power and lighting systems, power distribution, fire and life safety systems, electronic components, and voice and data communications infrastructure
- C&I engineering design i.e. access control and security systems, fire and life safety systems
- Landscape planning and design
- IT infrastructure design
- Construction and commissioning monitoring during project execution oversight
- Statutory Certification for existing and new works

### 3.2 Employer’s objectives and purpose of the works

The proposed project scope will address risk conditions presented by existing system and infrastructure deficiencies and limitations within the warehouse space. Maintaining regulatory compliance will also ensure the business operates within legal and regulatory boundaries.

### 3.3 Consultant’s obligations

The *Consultant* shall perform the *Services* in accordance with the Scope of Work with all reasonable care, diligence and skill in accordance with generally accepted professional techniques and standards. If the *Service Provider* is a joint venture or consortium of two or more persons, the *Service Provider* shall designate one person to act as leader with authority to bind the joint venture or consortium. Neither the composition nor the constitution of the joint venture or consortium shall be altered without the prior consent in writing of the *Employer*.

### 3.4 Interpretation and terminology

**Table 2: Abbreviations**

Abbreviation	Description
CBMS	Consolidated Building Management System
CCTV	Closed Circuit Television
C&I	Control and Instrumentation
ECSA	Engineering Council of South Africa
HVAC	Heating, Ventilation and Air-conditioning

**CONTROLLED DISCLOSURE**

Abbreviation	Description
ITP	Inspection and Test Plan
OHS Act	Occupational Health and Safety Act
O&M	Operating and Maintenance
PEC	Professional Engineering Certificate
SACAP	South African Council for the Architectural Profession
SACPCMP	South African Council for Project and Construction Management Professionals
SACQSP	South African Council for the Quantity Surveying Profession
uPVC	Unplasticized Poly Vinyl Chloride

### 3.5 Roles and Responsibilities

#### 3.5.1 Consultant

- a. Completes the services as outlined in the scope and service agreement.
- b. Observes all relevant regulations, standards of professional conduct and industry norms established in relevant South African National Standards including standards recommended by relevant professional associations etc.
- c. Demonstrate skill and care generally used by professionals

#### 3.5.2 Employer

- c. Provides all available information and data in the *Employer's* possession which may be required for the performance of the service.

## 4 Site Description

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 site has approximate coordinates 25° 55' 07.34"S and 28° 54' 43.30"E.

The location of the warehouse facility is given in Figure 1. The facility serves as the main storage area for material stock at the site. The warehouse is an open plan steel framed structure, approximately 23120 m<sup>2</sup> in area size.

**CONTROLLED DISCLOSURE**



Figure 1: Warehouse Location

## 5 Specification and description of the services

The *Consultant* provides engineering design services including construction and commissioning monitoring as well as statutory certification, in accordance with the Engineering Profession Act, 46 of 2000, Guideline for Professional Fees: Scope of services and Tariff of Fees for Registered Persons. The boundary of the scope of services is detailed. The *Consultant* co-ordinates the work of his subconsultants, as relevant. The *Consultant* co-ordinates interfaces to ensure design integration for all components of the *Works*.

### 5.1 Required services

The required services are detailed. The Consultant refers to section 5.2 for detailed requirements.

#### Inception

- a. The *Consultant* liaises with the project team and stakeholders to assess and establish the user needs and requirements.
- b. The *Consultant* inspects the project site. The *Consultant* establishes the need for specialist advice, studies, tests, investigations and surveys relevant to the scope of services, including assessing the availability and location of existing infrastructure and services. The Consultant is responsible for the appointment of such specialist resources and services. The *Consultant* performs and co-ordinates all studies, tests and surveys required for the scope of *services*. The *Consultant* collates outputs of specialist studies, surveys and advises on implications of the findings.
- c. The *Consultant* investigates, and collates data and drawings relating to the scope of *services*
- d. The *Consultant* assesses the existing infrastructural elements to ensure integration between existing and proposed new *works*.
- e. The *Consultant* reviews design data prepared by others, that interface or may impact his designs, for purposes of delivering sound designs.

**CONTROLLED DISCLOSURE**

- f. The *Consultant* arranges for all statutory/regulatory and other approvals related to the project

### Concept & Viability

- a. The *Consultant* develops the project concepts in accordance with the scope brief. An analysis criterion is established and a cost-benefit analysis is performed for concept options – *all scope elements are covered i.e. Civil & Structural, Mechanical, Electrical, C&I*. The *Consultant* prepares the concept designs and related documentation, which are suitable for costing. The *Consultant* coordinates the design interfaces with his *sub-Consultants*.
- b. 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.

### Design Development:

- a. The *Consultant* develops the detail designs and related documentation per the project brief. The *Consultant* incorporates the *Employer's* detailed requirements into the designs.
- b. The *Consultant* coordinates and incorporates all design interfaces
- c. The *Consultant* conducts design reviews in accordance with the *Employer's Design Review Procedure, 240-5311685* in collaboration with the project team
- d. The *Consultant* undertakes value (cost) engineering reviews. He reviews and adjusts design, drawings, schedules and documents, if necessary, to remain within budget.
- e. The *Consultant* prepares detailed estimates of construction costs of all scope elements i.e. civil and structural, mechanical, electrical, C&I etc.

### Contract Administration and Inspection

The *Consultants'* responsibilities include the following but not limited to:

- a. Attendance of site, technical and progress meetings
- b. Reviews quality assurance procedures
- c. Assistance with site clarification and tender queries
- d. Provide clarity on design details during construction as and when required
- e. Witnesses and reviews test works on and off site
- f. Reviews and approves *Contractor* drawings for compliance with contract documents
- g. Update and issue drawing registers
- h. Arranges and prepares test certificates and other statutory certification related to the project scope.

### Close-out

- a. The *Consultant* inspects and verifies the rectification of defects
- b. Compiles and/or procure operating and maintenance manuals etc. related to the Works.
- c. The *Consultant* prepares and submits record and/or as-built drawings and documentation upon project completion.

**CONTROLLED DISCLOSURE**

- d. The *Consultant* issues statutory certification i.e. Certificates of Compliance/Professional Engineering Certificates to confirm design and construction compliance

### **Additional Services pertaining to all Stages of the Project**

The *Consultant's* duties include the following:

- a. Condition assessment of existing facilities, structures and infrastructure or forensic investigations into defects of buildings and structures
- b. Perform topographical and environmental surveys, analyses, tests and site or foundation or other investigations, model tests, laboratory tests and analyses carried out on behalf of the *Client*.
- c. Setting out or staking out the works and indicating any boundary beacons and other reference marks.
- d. Preparation of drawings for manufacture and installation or detailed checking of such for erection or installation fit.
- e. Detailed inspection, reviewing and checking of designs and drawings not prepared by the consulting engineer and submitted by any contractor, or potential contractor, as alternative to those embodied in tender or similar documents prepared by the consulting engineer
- f. Inspection and testing, other than on site, of materials and plant, including inspection and testing during manufacture.
- g. Compiling record drawings related to designs done by others or related to alterations to existing works
- h. The *Consultant* reviews Contractor designs, shop drawings and other documentation to confirm conformity of design
- i. The *Consultant* reviews design data prepared by others, that interface or may impact his designs, for purposes of delivering sound engineering designs.
- j. The *Consultant* is responsible for setting out or staking out the works and indicating any boundary beacons and other reference marks pertaining to the scope of *Services*

## **5.2 Boundary of Scope of Services**

The boundary of the scope of *services* includes the following but not limited to:

### **Utility Surveys**

The *Consultant* performs utility scan surveys to verify existing subsurface services. The assessment activities aim to identify and map utility mains that are below ground in the footprint of the project site. Mains to be evaluated include the following but not limited to stormwater drains, electrical cables. The *Consultant* proposes the detection and location methods. Survey and scanning methods may include but not be limited to the following:

- 3D utility scan/detection
- GPR scanning etc.

**CONTROLLED DISCLOSURE**

## Geotechnical Services

The *Consultant* performs a detailed geotechnical investigation for the design of earthworks and infrastructure foundations. The scope covers the following but not limited:

- Security guardhouse
- Machine/equipment building
- Tank system supports
- Bund structures
- Trenches and tunnels
- Underground utilities i.e. stormwater, cabling, sewage
- Support and platform structures for mechanical, electrical, C&I components and equipment etc.

It is assumed that the new infrastructure will occupy an area of approximately 1 hectare (ha). The *Consultant* determines and confirms the extent of such an investigation, taking into consideration the area to be developed, extent of structures to be erected and the intended use of the structures. The geotechnical investigation shall be conducted in line with the latest national and/or international standards for site investigation and ground classification techniques (this includes sample acquisition and laboratory testing). The geotechnical investigation may involve the following activities but not limited to:

- *Desktop study i.e.:*
  - A review of the existing geological and geotechnical maps
  - A literature study
- *Excavation of Test Pits*
- *Dynamic Cone Penetrometer (DCP) test*
- *Dynamic Probe Super Heavy (DPSH) test*
- *Laboratory Testing i.e.:*
  - Grading (sieve & hydrometer analysis)
  - Maximum dry density (MOD AASHTO method)
  - California Bearing Ration (CBR)
  - Chemical analysis etc.

The *Consultant* evaluates the suitability of the in-situ materials for use as construction materials in the vicinity of the site.

The investigation results are presented in the form of a geotechnical report which will outline amongst others, the geotechnical conditions at the site, soil profiles, groundwater conditions, field and laboratory test results, information on the presence of expansive or collapsing soils, recommendations for foundation types and earthworks and identify other significant geotechnical issues and information that may be deemed necessary. The report shall be signed off by a professionally registered Geotechnical Engineer. The reports are submitted in electronic and hard copy formats.

## Specialist Engineering Services and Studies

The *Consultant's* duties include the following but not limited to:

- Perform investigations and site feasibility analysis and studies for purposes of evaluating the suitability of site

**CONTROLLED DISCLOSURE**

for the proposed works.

- Perform assessments of existing infrastructural elements with the objective to integrate existing works with proposed new works. The *Consultant* performs modification/alteration designs, as necessary. The assessment scope includes the following elements but not limited to structural steelwork, masonry works, concrete works, sheeting, plumbing and drainage. The assessment activities may include the following but not limited to:
  - Visual inspections
  - Laboratory testing (i.e., extent of attack on structural elements).
  - Non-destructive testing i.e:
    - 3D scan or shape survey using a laser scan.
    - Video inspections
    - Electromagnetic cover meter
    - Digi-Schmidt Hammer test etc.
  - Destructive testing i.e:
    - Concrete core samples
    - Chemical tests
    - Carbonation depth tests

## Architectural Design

- Perform architectural designs for new building structures. The building structures include the following but not limited to:
  - Security guardhouse
  - Machine/equipment room
- Perform building alterations or refurbishment designs, as necessary

## Civil and Structural design scope

The *Consultant* performs the structural designs for all items forming part of the project scope i.e. foundations, slabs, plinths, walls, beams, columns, struts and ties, connections etc. The *Consultant* performs the civil designs for all items forming part of the scope i.e. stormwater, sewer, roads. The design scope includes the following but not limited to:

### a. Security Guardhouse

- The Consultant perform building design and all related items forming part of the guardhouse facility

**CONTROLLED DISCLOSURE**

- Perform related civil designs for all items forming part of the guardhouse facility i.e. surface and subsurface stormwater drainage, sanitary drainage, trenches and tunnels, servitudes etc.

### ***Security Guardhouse Design Concept***

The proposed site location of the security guardhouse is indicated in Figure 2. The *Consultant* notes that there is an existing temporary guardhouse at the proposed site. The *Consultant* evaluates the suitability of the proposed site, as detailed. The *Consultant* identifies an alternative site, if deemed necessary.



**Figure 2: : Proposed Site Location of the Security Guardhouse**

The building consists of a reinforced concrete framed structure with a brick infill. The facility to be designed to accommodate at least 2 persons. The building dimensions shall be no less than 12m<sup>2</sup> and the room height shall be no less than 2.4m [SANS 10400 - C]. The ground slab or surface bed to be reinforced concrete and designed to carry all imposed loads. The slab thickness shall also suit the loadings and their usage. Building walls to be double brick, 220 mm (min) thick. Portholes to be provided in walling system to enable security personnel stationed in the guardhouse facility to return fire if necessary. Bullet resistant glass/glazing to be provided for the facility. The roof system and glazing to provide protection against 7.62mm x 51mm (R1/.308). Glazing to comply with SANS 1263 – 3 requirements etc. A solid security access door to be provided for the guardhouse facility. Solid doors to also be provided for interior doors. The building is fitted with a kitchenette and 1-off ablution. The kitchenette is equipped with a wash basin/sink. Wastewater and sewer to drain into the existing septic tank sited approximately ~30m from the proposed guardhouse site, or other proposed. The design of the guardhouse is carried out in accordance with the Kusile Power Station Conceptual Architectural Design Specifications for Structures and Other Buildings, 203-1239 as well as the Standard for Bullet-resistant Guard Huts, 240-912523315. The building architecture to align to the existing station building designs. The designs to integrate to the existing station systems and infrastructure, as far as possible.

The *Consultant* makes provision for the listed building services but not limited to:

**CONTROLLED DISCLOSURE**

- Fire & Potable water supply and distribution
- Sewer disposal
- Small power and lighting (interior and exterior)
- Earthing and lightning protection
- Access control
- Fire protection and detection,
- Heating, ventilation, and air-conditioning
- Camera surveillance
- IT infrastructure

Eskom's Corporate Identity Specifications: ESK AM AAA 1, Corporate Identity Manual and Interior specifications for Eskom: ESK PB AAQ 3, shall be adhered to for all designs to ensure that all architectural components are compliant to Eskom's corporate requirement.

The *Consultant* caters for stormwater drainage in his designs

#### **b. Ablution Facility**

- The *Consultant* performs a detailed inspection of the existing septic tank system to ascertain its adequacy for long term use and to confirm the need for alteration, repair or replacement. if deemed necessary, the *Consultant* performs a re-design of the septic tank system. The *Consultant* performs a feasibility study, to confirm the suitability of an alternative site for a new tank installation.
- Perform a redesign of the ablution block. The facility design adheres to the requirements of industry guidelines and norms. The design scope includes all associated facility services i.e. sanitary drainage
- Perform related civil and structural designs for all items forming part of the ablution facility and its associated drainage system

#### ***Ablution Block Design Concept***

The *Consultant* re-designs the existing ablution block in accordance with SANS 10400:P,Q ,S, the Kusile Power Station Conceptual Architectural Design Specifications for Structures and Other Buildings, 203-1239. The building architecture to align to the existing station building designs. The designs to integrate to the existing station systems and infrastructure, as far as possible. The total occupancy number of the area can be assumed to be 60 people (30 females and 30 males). The drainage installations shall be so designed and constructed that such that an adequate number of sanitary fixtures is provided in relation to the population and class of occupancy of the building area. As a minimum, the required sanitary fixtures for female and male personnel include the following:

- Female Ablution – 3 toilet pans, 2 wash-hand basins
- Male Ablution – 1 toilet pan, 2 urinals, 2 wash-hand basin

Adequate access shall also be made for the inspection, cleaning and maintenance of drain and

**CONTROLLED DISCLOSURE**

sewer installations.

### c. Machinery/Equipment Housings

- Perform structural design of machine housing/s to house/store pumps, motors, electrical boards equipment etc.
- Perform related civil designs for all items forming part of the machine/equipment rooms i.e. fencing, stormwater drainage, trenches, tunnels/servitudes etc.

#### ***Equipment Room Concept***

The equipment housing design to align to relevant SANS standards and Eskom specification documents i.e. 240-56355541: C&I Computer & Equipment Rooms Civil and General Building Requirements Guideline and 240-56355731: Environmental Conditions for Process Control Equipment Used at Power Stations Standard.

### d. Spill Containments

- Perform design for spill containment systems and their associated drainage.

#### ***Spill containment concept***

The bund designs shall align to the requirements and specifications set out in SANS 10131. The bunds will be adequately sized to accommodate the full tank volumes plus 10%. The volumetric capacity of the bunded area shall not be less than the greatest volume of oil product that can be released from the largest sized tank in the containment area. The bund shall be impermeable to liquids and its height shall be restricted to 1.8m.

Drainage shall be provided within the bunded area for drainage of rainwater via a valve (or similar). For tanks exceeding a volume of 1000L, a drain sump with an oil water separator shall be provided inside the bunded area. The spill containment designs caters for the following but not limited to access systems and platforms

### e. HVAC, C&I, Potable & Fire Water Infrastructure

- Perform designs for equipment foundations and support structures for tank systems, pump machinery, access platforms, piping and electrical equipment, servitudes i.e., distribution boards, junction boxes, trunking, cable trays/racking, cable tunnels etc. The *Consultant* to design all civil and structural elements associated with the aforementioned systems

### f. General

- Perform surveying and setting out activities for all items forming part of the project scope
- Perform temporary support structure designs, as necessary
- Perform design of servitudes, tunnels, trenches, manhole structures etc.

**CONTROLLED DISCLOSURE**

### g. Specifications & Standards for Civil & Structural Works

The scope of *service* shall be performed in accordance with the South African National Standards, prescribed Eskom standards and any other applicable codes of practice, specifications, and regulations. Reference to standards or manuals, 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 normative references in section 2.1.4. If there is any contradiction within the codes and standards, the *Consultant* liaises with the Employer for clarification. The *Consultant* adheres to the latest issue of the listed standards/codes/publications. The *Consultant* notes that the provided lists are not all-inclusive and does not relieve the *Consultant* from complying with all applicable codes.

### h. Design Criteria

The general basis of structural design utilizes the partial factor limit states approach to achieve appropriate levels of reliability for the design of safe and sound structures. The requirements and procedures are formulated to achieve acceptable levels of safety, serviceability and durability of structures within the scope of the application of the SANS 10160 series.

The design of foundations, steel and concrete structures and their component parts are based on and conform to the following standards, or their equivalent:

- **Foundations:**

The design of foundations are in accordance with SANS 10161, 10400-H etc.

- **Concrete:**

Designs are in accordance with SANS 10100 series and the Kusile Power Station Specification for Structural Concrete.

- **Steel:**

Designs are in accordance with SANS 10162, Red Book (2016), 240- 56364545 – Structural Design & Engineering Standard, 203-1239 Kusile Architectural Specification etc.

- **Masonry:**

Designs are in accordance with the requirements of SANS 10164, 203-1239 Kusile Architectural Specification etc.

- **Sewer Infrastructure**

The *Consultant* complies with the requirements of SANS 791, SANS 677, SANS 10400 P & Q, 240- 85549846 Standard for Design of Drainage and Sewerage Infrastructure, as relevant

**CONTROLLED DISCLOSURE**

- **Corrosion protection**

All corrosion protection conforms to the requirements of 240-106365693 'Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings' as a minimum

- **Waterproofing**

Damp proofing and waterproofing comply with the specifications and requirements given.

Waterproofing materials are applied in accordance with SANS 10021.

- **Cladding and sheeting**

The *Consultant* adheres to the latest issue of SANS 517, SANS 10237 etc

## **Electrical systems design scope**

The *Consultant's* duties include the following:

- Perform design of power distribution systems covering all scope elements i.e. mechanical & electrical and C&I components etc.
- Cater for uninterrupted power supply (UPS) to support the facility area
- Perform designs for small power and lighting for the following building areas but not limited to:
  - Existing warehouse facility
  - Security guardhouse
  - Ablution block
  - Machine and equipment housings

The *Consultant* notes that HPS High Bay lighting is currently installed in the warehouse building.

The *Consultant* redesigns the lighting to LED High Bay lighting – the design must clearly indicate compliance with interior lighting standards. The *Consultant* designs high mast lighting for the warehouse vicinity need for additional High mast lights outside the building and designs must show sufficient project of light

### *Electrical Concept Design:*

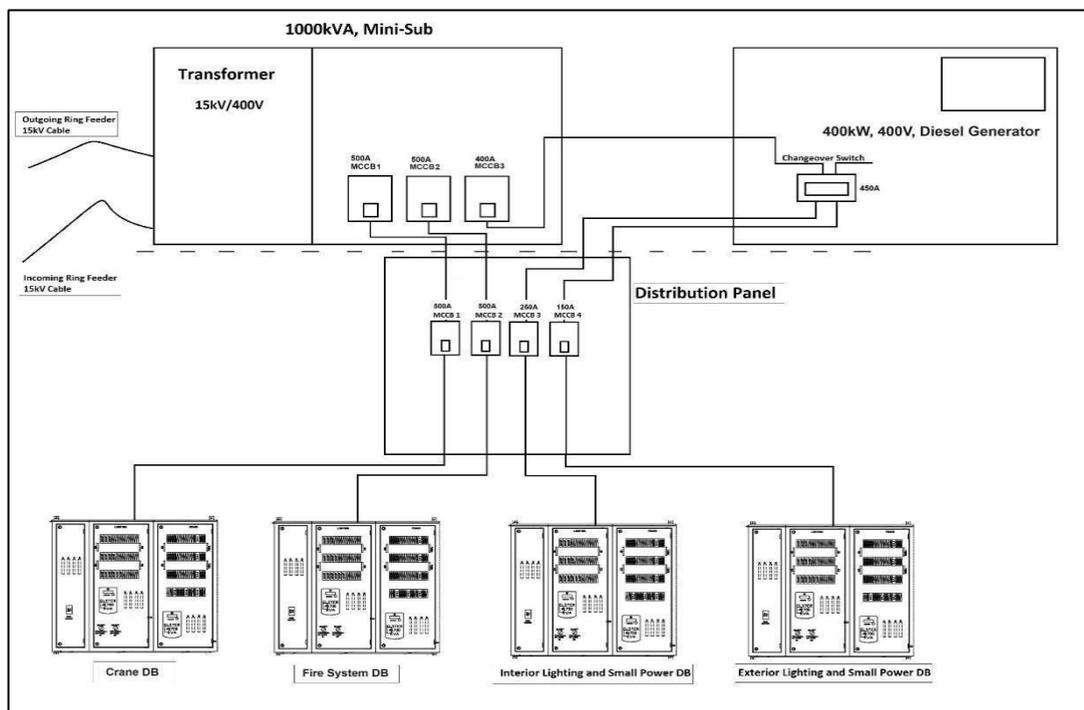
The following are estimated loads that will be supplied from the mini substation.

- a) High mast lighting (assuming six 1000W lights on each) – total load - 20kW
- b) Interior lighting load totals approximately 50kW
- c) Crane load totals approximately 200kW

**CONTROLLED DISCLOSURE**

- d) 2-off fire protection pump motors ~180kW.
- e) Power provision for MW Motors preservation (2kW being the highest space heater for MV Motors to be powered continuously while the motors are still stored). Looking at powering up to 50 Motors space heaters which total up to 100kW.
- f) Provision for new distribution boards to be installed will be for 200kW which will be able to cater for:
  - Welding plugs
  - CBMS
  - HVAC
  - Other small power requirements

The total estimated load for all the systems requiring power supply is approximately 750kW. The existing mini-sub is rated 1000kVA/850kW. Thus, the existing mini-sub will be sufficient for the expected load requirements at Ex-GE Stores.



**Figure 3: Power Supply with Essential Loads Back-up**

The electrical loads will be distributed separately as shown in figure 5 above, where the Crane and Fire Protection system will have a dedicated DB, Small Power for welding plugs, MV Motors Space heaters (preservation) will be powered from the lighting and small power DBs.

There is also provision made for a backup system in cases where the main supply would be affected either by

**CONTROLLED DISCLOSURE**

faults along the line, power source, mini-sub, etc. The use of a 400kW Generator is proposed, to cater for essential loads i.e. lighting and small power (external and internal) and CBMS (see Figure3).

### Distribution Boards

The *Consultant* notes the following:

- a) Crane DB must have an incomer MCCB rated at 500A, to cater for 170kW Crane motor plus five (5) 3kW Crane Drive motors.
- b) Fire System DB must have an incomer MCCB rated at 500A, to cater for two (2) 90kW Fire Motors.
- c) Interior Lighting and Small Power DB must have an incomer MCCB rated at 250A to cater for all existing small power loads including any future additions.
- d) Exterior Lighting and Small Power DB must have an incomer MCCB rated at 150A to cater for all existing small power loads including any future additions.

### Cables

From Destination	To Destination	Cables Size	Cable Length (m)
500A MCCB 1 in Mini-Sub	500A MCCB 1 in Main Distribution Panel	2x 120mm <sup>2</sup> , 1000V, 4-Core, Flexible Cable	30
500A MCCB 2 in Mini-Sub	500A MCCB 2 in Main Distribution Panel	2x 120mm <sup>2</sup> , 1000V, 4-Core, Flexible Cable	30
400A MCCB 3 In the Mini-Sub	450A Changeover switch in the Generator	2x 95mm <sup>2</sup> , 1000V, 4-Core, Flexible Cable	10
450A Changeover switch in the Generator	250A MCCB 3 in Main Distribution Panel	95 mm <sup>2</sup> , 1000V, 4-Core, Flexible Cable	30
450A Changeover switch in the Generator	150A MCCB 4 in Main Distribution Panel	50 mm <sup>2</sup> , 1000V, 4-Core, Flexible Cable	30
500A MCCB 1 in Main Distribution Panel	Crane CB 500A MCCB	2x 120mm <sup>2</sup> , 1000V, 4-Core, Flexible Cable	100
500A MCCB 2 in Main Distribution Panel	Fire System DB 500A MCCB	2x 120mm <sup>2</sup> , 1000V, 4-Core, Flexible Cable	150
250A MCCB 3 in Main Distribution Panel	Interior Lighting and Small Power DB 250A MCCB	95 mm <sup>2</sup> , 1000V, 4-Core, Flexible Cable	250
150A MCCB 4 in Main Distribution Panel	Exterior Lighting and Small Power DB 150A MCCB	50 mm <sup>2</sup> , 1000V, 4-Core, Flexible Cable	250

Routing of cables shall be as follows:

- a) Cables from the Mini-Sub to the Main Distribution Board must be routed underground through

**CONTROLLED DISCLOSURE**

- b) cables sleeves,
- c) Cables from the Mini-Sub to the Diesel Generator must be routed underground through the cable sleeves.
- d) Cable from the Diesel Generator to the Main Distribution Board must be routed through the cable sleeves.
- e) All Cables from the Main Distribution Board to other Distribution Board must be routed to cable rack system.

### **Earthing**

Kusile Power Station has an earth mat that covers the whole station. Earthing for the warehouse must be tapped from the electric fence earthing as it is connected directly from the station earth mat. For functional earth, earth must be connected to the Mini-sub earth. All equipment such as motors, pumps, tanks etc. must be connected to the earth mat.

### **Uninterrupted Power Supply**

A 230Vac, 5kVA Uninterrupted Power Supply is proposed for the warehouse area. This is to be installed in parallel with the power cable to the CBMS from the Interior Lighting and Small Power DB to ensure consistent supply of power to the CBMS.

### **Wet services design scope**

The *Consultant's* duties include the design of potable and fire water supply and distribution systems to support the listed areas. It is proposed that the water supplies are terminated from the existing permanent infrastructure.

- Warehouse facility
- Security guardhouse
- Ablution block
- Machinery housings

#### **a. Fire Protection Design Scope**

- i. The *Consultant* to Perform a Fire Risk Assessment (FRA) of the listed building areas, in accordance with the relevant Eskom Fire Protection Standards and SANS Codes.
- ii. Based on the outcome for the FRA, perform the detail design of the required Fire Protection Systems applicable to the above listed areas etc.
- iii. For all the above, the *Consultant* is responsible to design the potable water supply system to supply the fire protection system as per the chosen design.
- iv. Care should be taken for interfacing systems such as HVAC and fire detection systems.

#### **CONTROLLED DISCLOSURE**

## b. Potable Water System Design

The *Consultant* performs the design for the potable water supply and distribution systems. An occupancy number of 60 personnel is assumed for the warehouse facility. It is assumed that two (2) personnel will occupy the guardhouse.

The scope includes the following but not limited to:

- i. Potable water tap off from the nearest existing potable water line
- ii. Potable water distribution to all applicable areas
- iii. Hot water reticulation for all applicable areas

## **Heating, Ventilation and Air Conditioning system (HVAC) design scope**

The *Consultant* shall design the HVAC systems within the scope of services. All items of works are included as part of the design i.e. civil, electrical, mechanical, control and instrumentation. The system design is to achieve the following but not limited to the following:

- To control environmental conditions within building structures for personnel comfort
- To control environmental conditions in building structures for correct operation and protection of equipment/plant/systems etc.
- To air pressurize building structures so as to improve indoor air quality by preventing infiltration of outdoor pollutants and contaminants including maintaining fire and smoke control etc.
- To supply fresh air and maintain the minimum air changes per hour
- To provide appropriate filtration etc.

## **Design Specification**

The areas requiring HVAC systems include the following but not limited to:

- Warehouse storage area
- Office spaces
- Ablution facility
- Guardhouse facility
- Equipment rooms/housings

The indoor conditions are designed to be as followed:

**CONTROLLED DISCLOSURE**

Description	Indoor Temperatures	Relative Humidity	Pressurization Requirements
1. Offices	22°C±2°C	The relative humidity is to be controlled per ASHRAE 55: Thermal Environmental Conditions for Human Occupancy (latest edition).	Positive pressure (minimum positive pressure of 5Pa with all doors closed) with 2 ACH
2. Open storage area	6°C above ambient	Not Controlled	Slightly positive pressure with 10 ACH
3. Ablution facilities	Natural ventilated through openable windows	Not Controlled	Slightly negative pressure with 10 ACH
4. Server room	22°C±2°C	50%±10%	Positive pressure (minimum positive pressure of 5 Pa with all doors closed) with 2 ACH

### I. Offices

The offices are currently equipped with split air conditioning without any fresh make-up. It is proposed that the existing units be replaced with a new air conditioning system. The new air conditioning system to provide filtered air from the outside at two air changes per hour.

### II. Open storage area

The storage area is approximately 23120 m<sup>2</sup> and is currently equipped with multiple wind turbine roof ventilators installed at roof ridge level, without provisions for make-up air from the outside.

Storage areas are natural or mechanical ventilated based on their classification in terms of SANS 10400 (National Building Regulations). If mechanical ventilation is proposed, the criteria of ten air changes per hour to apply, as a minimum. It is proposed that the storage area ventilation be upgraded with wall-mounted louvres with primary filters for fresh air intakes, and multiple wind turbine roof ventilators will provide extraction.

SANS 10400-T: States that any room in which the floor area is more than 500 m<sup>2</sup> must be provided with mechanical ventilation or natural smoke ventilation. Smoke Roof ventilators will be provided to exhaust the smoke from the storage area during fire conditions. The smoke ventilation system will be interfaced with the fire detection system.

### III. Server Rooms

The HVAC requirements for server rooms are described in Eskom Server Rooms and Data Centres Standard (32-894). The server room is to be provided with 2-off split type cooling only air conditioning units on a running and standby mode together with a matching fresh air unit for pressurization purposes.

**CONTROLLED DISCLOSURE**

#### IV. Pump house

The HVAC requirements for pumphouses are mechanical ventilation with air extraction.

##### **HVAC consultant requirements**

- a) The Consultant must provide the complete mechanical, civil, electrical and C&I designs with relation to the HVAC systems.
- b) The Consultant must design the system as per SANS 10400 and it must adhere to the standards as per Table 1
- c) It is recommended that a ducted HVAC system is designed and not necessarily a single ducted system to service the entire building. Temperature control must be provided for individual rooms.
- d) The HVAC design must take into account the summer and winter climate conditions of the eMalahleni area.
- e) A dedicated HVAC plant room must be designed which consists of the HVAC air handling units, condenser units, Motor Control Centre, and Local Control Panels. This must be serviced by the HVAC system to maintain the correct room temperature.
- f) Redundancy must be provided for the major HVAC equipment as well as electrical equipment so that there would be easy access during maintenance.
- g) Accessibility to HVAC equipment such as filters, valves, motors, and control boxes etc must be designed with due consideration to easy access.
- h) A smoke extraction system must be provided for in the design.
- i) The HVAC systems are to be interfaced with the fire protection system and CBMS.
- j) The consultant must provide the following documentation on the HVAC systems during their submission.
  - Detailed mechanical design report indicating calculations and the design methodology regarding selection of equipment such as for fans, dampers, valves etc.
  - Heat load calculations including software simulations.
  - Detailed Bill of Quantities for HVAC system
  - Detailed and dimensioned drawings
  - Air balancing diagrams for each zone/room
  - Spares lists and confirmation of availability of spares with lead times.
- k) The designs are subject to review of the Eskom engineering team.

##### **Consolidated Building Management Systems (CBMS) design scope**

The scope of design for the Building Management System to cover the following areas but not limited to the warehouse storage, office and server room areas, guardhouse facility, ablution block and machinery housings. The system design includes the following but not limited to:

- CCTV monitoring system
- Access control system
- Fire detection system
- Intrusion detection system
- UPS system for C&I equipment

**CONTROLLED DISCLOSURE**

The design scope includes integration to the existing

CBMS. The *Consultant's* duties include the following:

The *Consultant* to design a fire detection system, access control system, and CCTV system. The fire detection, access control, and CCTV systems shall be interfaced to the existing site consolidated building management system (CBMS) which is based on Honeywell Enterprise Building Integrator (EBI). All systems shall be provided with all necessary software, licensing, and configured parameters. Systems with periodic licenses are not recommended. Systems used for security shall comply with the requirements of the National Key Point ACT 102 of 1980. The following is a high level Kusile power station CBMS architecture:

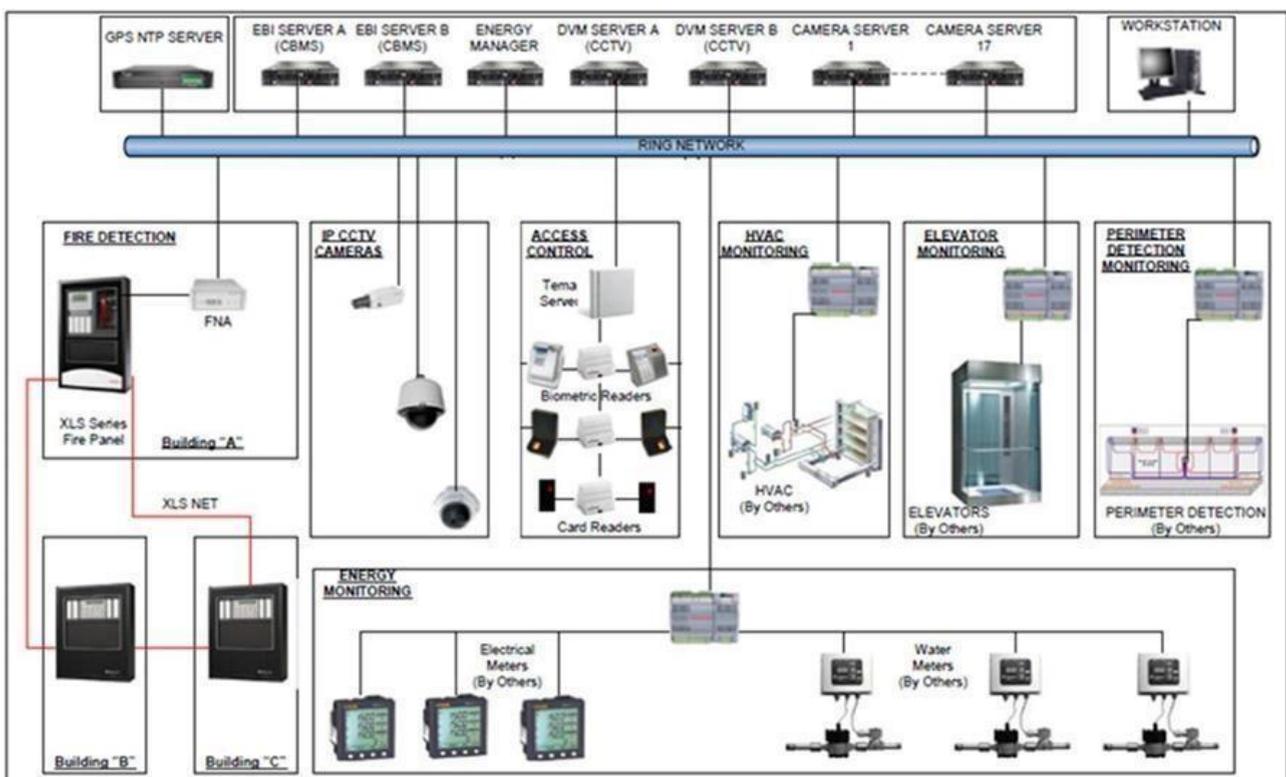


Figure 4: Kusile CBMS High Level Architecture

The following are the minimum relevant standards applicable for designing the systems:

**CONTROLLED DISCLOSURE**

**Table 3: C&I Standards**

NFPA 72	National Fire Protection Association
SANS10139:2012	South African National Standards
BS5839	British Standards
EN54	European Norms
36-776 (Previously GGS 1426)	Environmental Conditions for Process Control Equipment Used At Power Stations
36-963	Alarm System Performance of Digital Control Systems Applied in Fossil Plants
39-60	Eskom Quality Requirement Standard
200-11757	Earthing and Lightning Protection
200-11764	Lighting and Small Power Installation
200-11768	Station Cabling and Racking Standard
GGG 0386	Requirements for Control and Power Cables for Power Stations
32-123	Emergency Planning Standard
240-64720986	Emergency Preparedness Public Address SYSTEM – FOR LARGE AREA DEPLOYMENT
ISO 7240 – 16&19	South African National Standard for Voice Alarm Systems
32-123	Emergency Planning Standard
SANS 2220-2	Access control systems Part 1 – Part 7
SANS 61000-1-2	Electromagnetic compatibility (EMC) Part 1-2
240-86738968	Specification for Integrated Security Alarm System for Protection of Eskom Installations and its Subsidiaries
240-55410927	Cyber security standard for Operational Technology
240 – 56872313	Radio Station Earthing and Bonding
240-70413291	Specification for Electrical Terminal Blocks
240-64636794	Standard for Wiring and Cable Marking in Substations
240-91190304	Specification for CCTV Surveillance with Intruder Detection

### Fire detection

The system shall monitor all Fire Detection System components on a continuous basis for fire, smoke and fault conditions. Alarms shall be annunciate/indicated both audibly and visually. All fire and fault alarms, as well as a change in the status of any field device shall be recorded locally at the panel's logbook and also to the CBMS server. The panel displays shall indicate time, date, power status, and loop alarm status. For ease of maintenance and spares holding, the proposed fire detection systems shall use the same equipment as the existing fire detection system. The *Consultant* shall design, install, commission, and integrated a fire detection system into the existing fire detection system.

the existing fire detection system is controlled by one of the following types of fire detection control panels and fire network equipment:

### CONTROLLED DISCLOSURE

- a) Fire Control Panel (XLS-3000)
- b) Fire Control Panel (XLS-120)
- c) Fire Control Panel (XLS-140)
- d) Fire Network Adapter (Q7055C1035)
- e) Network Communication Module (NCM-F)

The existing fire detection system consists of the following field devices:

- a) Intelligent photoelectric smoke detector (TC806B1076)
- b) Intelligent Heat Detector (TC808B1041)
- c) Intelligent Manual Pull Station (S464G1007)
- d) Intelligent Supervised Control Module (TC810N1013)
- e) Intelligent Relay Module (TC810R1024)
  
- f) Intelligent Monitor Module (TC809A1059)
- g) Intelligent Analog Input Module (TC809C1004)
- h) Interface Module (TC841A1000)
- i) Intelligent Fault Isolator Module (TC811A1006)
- j) Galvanic Isolator (MTL5561)
- k) Pressure Switch (EPS10-2)
- l) Horn/Strobe (CHSR)
- m) Remote Power Supply (HPF24S8E)
- n) 2 Core SLC Cable
- o) 2 Core 24 VDC Cable
- p) 2 CORE (4-20) ma SIGNAL CABLE
- q) 2 CORE NAC CABLE

### **Access Control**

The use of access control systems is to enhance the access monitoring of sites, as well as data storage of access for litigation purposes. An access control system provides a means to restrict access in certain suites/facilities for operational requirements and management of entry/exit incidents within the site which can then be reviewed and analysed in detail. For ease of maintenance and spares holding, the proposed access control systems shall use the same equipment as the existing access control system. The following is the high level architecture for ACS:

### **CONTROLLED DISCLOSURE**

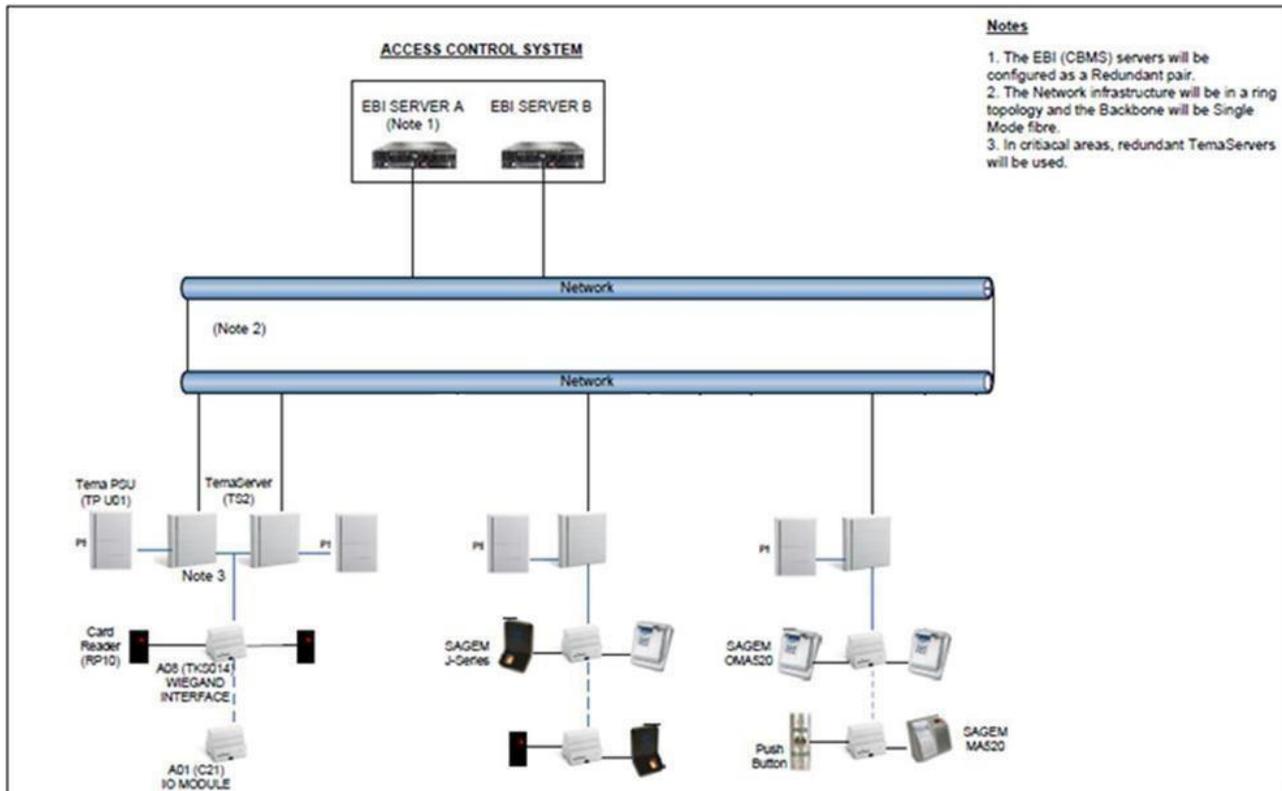


Figure 5: High Level Architecture for ACS

The ACS comprises of redundant EBI servers, Temaline Access Control System and range of different hardware involved in the solution to prevent unauthorized access into restricted areas in the Kusile Power Station project. EBI system is a one-window, web-enabled system that allows the user to control everything on security systems. Built on Open standards EBI can easily integrate with other Honeywell open control system. The *Consultant* shall design, construct, and commission an access control system that is based on the Temaline access control system. The access control system shall be integrated in to the Kusile central system which is based on the Honeywell Enterprise Building Integrator (EBI) and fire detection system for the purpose of unlocking specific doors in case of fire alarm event. A suitable medium shall be utilised for integration the ACS into the site EBI which is based on an ethernet network.

The ACS will control all security gates, gate access, as well as the all door access in the building. All personnel working at the plant will be issued a proximity card. Access to the site or any controlled entry or exit will be allowed or disallowed according to rules set up within the Access Control System. Readers and door control mechanisms will be installed on building entrances, as well as specific rooms within the building. All the doors will have magnetic contact alarms to indicate when a door has been left open or opened without authority. This will give alarm / event in the control rooms.

**CONTROLLED DISCLOSURE**

The proposed ACS solutions shall consist of the following where required:

- a) Temaline Controller (TS2)
- b) Temaline Power Supply Unit (TP U01)
- c) RTU/Lock Power Supply Unit
- d) RTU-A08 (TK\_S014)
- e) RTU-A01 (TK\_C21P)
- f) Multi Technology Smart Card Readers (RS-10)
- g) MorphoAccess Biometric Readers
- h) Electromagnetic Door Locks
- i) Egress Push Button
- j) Magnetic Door Contacts
- k) Break Glass Units

## CCTV

The existing CCTV system is based on Digital video manager (DVM) software for Video surveillance, real time monitoring and recording of events throughout the entire site. The system shall comply with the requirements of 240-91190304-Specification for CCTV Surveillance with Intruder Detection as a minimum. For ease of maintenance and spares holding, the proposed CCTV systems shall use the same equipment as the existing CCTV system.

Following are the main components of the existing CCTV system:

- a) Fixed Indoor Network Cameras (Honeywell-HD4MDIPX)
- b) Thermal Network Cameras for monitoring perimeter area (Axis-Q1921/E)
- c) PTZ Cameras for Monitoring perimeter areas (Honeywell – HDZ302LIW)
- d) Bullet IR Cameras for monitoring perimeter areas (Honeywell – HCD95534)
- e) EBI Servers (DVM system is integrated with EBI.)
- f) DVM Database & Camera Servers
- g) Storage Devices
- h) DVM software & license
- i) DVM operator workstations

CCTV System is centrally monitored by Digital Video Manager (DVM) which is integrated with Enterprise Buildings Integrator (EBI). The *Consultant* shall design, construct, commission, and integrate the building CCTV system into the existing DVM and EBI systems and configure it for the following:

- a) Intelligent recording
- b) Standard Video Motion Detection
- c) Video collection, storage, and retrieval
- d) Advanced search capabilities
- e) Video storage=
- f) Digital signatures and audit trail
- g) Multiple view
- h) Sequence view
- i) Intruder detection
- j) Alarm monitors

## CONTROLLED DISCLOSURE

- k) Internet Explorer (IE) Clients
- l) Allows you to simultaneously record and view live video from a camera and playback recorded video
- m) Quality assurance of the image between the camera and the recording system
- n) There is no quality degradation in recorded videos through time
- o) The video recordings can be digitally signed for security purposes
- p) Video images can be sent through the computer networking (LAN, WAN)

The *Consultant* shall make provision for expanding the DVM storage and additional software licences, EBI if required.

### **EPPA**

The *Consultant* to design, install, commission an emergency preparedness public address system to meet the requirement of the EN54 for voice alarms. Only equipment certified under EN54 Standard by an authorized certification body may be proposed where applicable. The system shall be equipped with EN54 compliant stand-by batteries to cater for a minimum stand-by period of 24 hours and a continuous broadcast of 30 minutes at full power. The Eskom EMERGENCY PREPAREDNESS PUBLIC ADDRESS SYSTEM – FOR LARGE AREA DEPLOYMENT standard shall be adhered. For ease of maintenance and spares holding, the proposed EPPA systems shall use the same equipment as the existing EPPA system.

The proposed system shall interface to the existing public address system which is based on the following equipment:

- a) Public address and voice evacuation system (Ateis IDA8)
- b) Touch screen console with microphone (Ateis PSS-AS)
- c) Power amplifiers (Ateis DPAfour125 and DPAfour250))
- d) Loudspeakers (Penton)
- e) Strobe (Penton)
- f) Battery Charger (Ateis Sonaes)

The system shall be capable of accommodating any external inputs from stand-alone panels such as fire detection and access control panels. The system shall also be capable of providing outputs to trigger indicating equipment such as buzzers and lights. The system shall have an Ethernet port for the purposes of connecting a service terminal as well as connection to a LAN port for remote access. The system shall be capable of logging a minimum of 10 000 event logs on a CF card in text format which can be accessed even after a total system failure, events shall be remotely accessible.

The system speakers shall meet the following requirements:

- a) Ceiling-mount & Wall-mount speakers: 90dB - 94dB @ 1w @ 1m.

### **CONTROLLED DISCLOSURE**

- b) Projection speakers: 91dB - 97dB @ 1w @ 1m.
- c) Horn speakers: 109dB @ 1w @ 1m.
- d) Speaker cabling shall be a minimum PH120 class as per EN50200/SANS10139. All fire-rated speaker equipment must comply with EN54-54 specifications.

### **IT Infrastructure Design**

The *Consultant* performs the IT infrastructure design associated with the project scope elements.

## **5.3 Engineering and the *Consultant's* design**

### **5.3.1 *Consultant's* responsibility for his design**

The *Consultant's* responsibilities include the following but not limited to:

- a) The *Consultant* is mandated in terms of the Construction Regulations 2014: Duties of Designer, 6(1) g to fulfil the duties described therein. Any risks associated with the *Consultant's* design is highlighted to the *Employer* together with the mitigation measures
- b) The *Consultant's* design is required to be in accordance with all National Standards and Specifications referenced in this scope document as well as the *Employer's* Standards.
- c) The *Consultant* assumes full design accountability and liability for his designs (temporary works included)
- d) All designs, design reports and construction drawings prepared by the *Consultant* are signed off by an Architectural Professional (registered with SACAP) and Professional Engineers or Technologists (registered with ECSA), who take full professional accountability for the designs.

### **5.3.2 Procedure for Submission and Acceptance of *Consultant's* Design**

The *Consultant* shall conduct design reviews in accordance with the *Employers* Design Review Procedure, 240-53113685 and participate in all reviews as specified by the *Employer*.

The *Consultant* notes that he is the Design Authority as defined in the *Employer's* Design Review Procedure for the project scope. The design authority remains responsible and accountable for the correctness of the design documents, irrespective of whether these documents have been reviewed by the *Employer*.

The following documentation review process is followed for submission of documents:

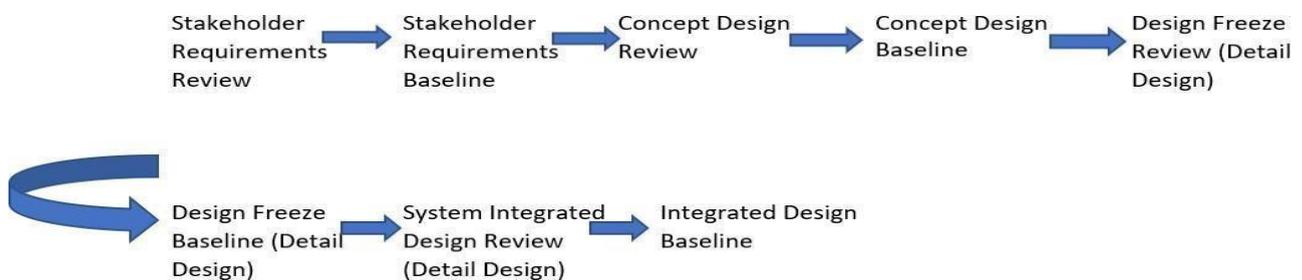
- The *Consultant* submits the documents to the *Project Manager* for review. The *Consultant* shall allow the *Project Manager* 21 days to review and respond to the *Consultant's* document submission i.e., from time of receipt by the *Project Manager*
- The *Employer's* project team reviews the design documentation and submits all comments to the *Project Manager*. On receipt of the reviewed documentation, the *Consultant* makes any modifications requested

**CONTROLLED DISCLOSURE**

by the project team and resubmits the revised documents to the *Project Manager* within two (2) weeks of receipt. Queries regarding comments/changes made by the *Employer's* project team are addressed with the *Project Manager* prior re-submittal of documentation. Document re-submittals which have not included the comments identified, will be returned to the *Consultant* for correction. The *Consultant* shall re-issue the revised documentation incorporating all comments and details not included in the previous document issue, within 2 (two) working days of receipt.

The *Consultant* notes that no costs arising from any revisions, which are a result of the *Consultant's* omission, may be claimed from the *Employer*. This includes costs incurred by the *Consultant* in completing such designs and drawings

- The *Consultant* organises review sessions once all noted comments have been addressed and documents revised. If any further issues are found during the review process or further actions are required, the *Consultant* records all concerns and revises the documents accordingly. The *Consultant* compiles an end- of phase design review report and submits to the *Project Manager* for acceptance, upon completion of the review stage. The design review process follows the below process flow;



### 5.3.3 Change Management

Engineering design changes are performed in accordance to the latest revision of the Eskom Project Change Management Procedure [240-53114026]. The *Employer* ensures that *Consultant* is provided with latest revision of this procedure. Any uncertainty regarding this procedure should be clarified with the *Employer*.

### 5.3.4 Acceptance of the *Consultant's* Design

The *Consultant* implements the following for design acceptance:

- a) The *Employer* accepts the *Consultant's* design upon completion of reviews by the *Employer's* project team.
- b) The *Consultant* stamps, dates and signs his designs, 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.

**CONTROLLED DISCLOSURE**

## 6 Constraints on how the *Consultant* Provides the Services.

### 6.1 Management meetings

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

Title and purpose	Intervals	Location	Attendance by:
Project kick-off meeting	Once-off	Virtual meeting	Employer, Employer's engineering representatives and Design consultants
Project progress meeting	Monthly	Virtual meeting	Employer, Employer's engineering representatives and Design consultants
Risk register and compensation events	Bi-weekly	Virtual meeting	Employer, Employer's engineering representatives and Design consultants
Engineering design interface meetings – progress one engineering deliverables	Bi-weekly	Virtual meeting	Employer, Employer's engineering representatives and Design consultants
End of Phase review meetings: (Interim and final) – ascertain if all design requirements as set out in the scope of work are met	Ad hoc basis as the design packages are completed, with the final Integrated design review once all the packages are complete.	Virtual meeting	Employer, Employer's engineering representatives and Design consultants

Meetings of a specialist nature may be convened. If not specified, the locations are to suit the parties concerned. Records of meetings are submitted to the *Employer's* agent by the person convening the meeting within five (5) 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

**CONTROLLED DISCLOSURE**

## 6.2 Consultant's key persons

The Principal *Consultant* shall submit a Personnel Schedule detailing Key Persons who will perform the Service. The service provider shall provide all data pertaining to his Key Persons including their qualifications, experience and estimated periods of engagement on the performance of the service.

Key persons shall have the necessary competencies and work experience necessary to perform the service. The services shall be performed by the personnel listed in the Personnel Schedule for the periods of time indicated therein. The *Consultant's* key persons become a contractual obligation upon contract award

Where the principal *Consultant* proposes to utilize a person/s not named in the Personnel Schedule, he shall submit the name, relevant qualifications and experience of the proposed replacement person to the Employer for approval.

The Principal *Consultant* may, subject to the *Employer's* approval, make adjustments to the data, as may be appropriate, to ensure the efficient performance of the services, provided that the adjustments will not cause payments to exceed any limit placed on the contract price. Any proposed change should be handled formally through a written request to the *Employer* for approval.

The project personnel required in the management and delivery of the project, include the following but not limited to:

- Project Manager registered with SACPCMP
- Architectural Professional professionally registered with the SACA, with 5 years related experience in architectural design. Resource has a formal engineering degree (or equivalent qualification) in the relevant discipline i.e. BSc/B.Tech (Architecture)/MArch,
- Structural Engineer/Technologist, professionally registered with ECSA with 5 years related experience. Resource has a formal engineering degree (or equivalent qualification) in the relevant engineering discipline  
i.e. BSc/BEng/BTech/Meng, with demonstrable experience in structural design
- Civil Engineer/Technologist, professionally registered with ECSA with ECSA with 5 years related experience. Resource has a formal engineering degree (or equivalent qualification) in the relevant engineering discipline  
i.e. BSc/BEng/BTech/Meng, with demonstrable experience in civil design
- Geotechnical Engineer, professionally registered with ECSA with 5 years related experience. Resource has a formal engineering degree (or equivalent qualification) in the relevant engineering discipline i.e. BSc/BEng/BTech/Meng, with demonstrable experience in conducting geotechnical site investigations and design
- Professional Land Surveyor professionally registered with the SAGC
- Electrical Engineer/ Technologist, professionally registered with ECSA with 5 years related experience. Resource has a formal engineering degree (or equivalent qualification) in the relevant engineering discipline  
i.e. BSc/BEng/BTech/Meng, with demonstrable experience in electrical system design
- Mechanical Engineer/ Technologist, professionally registered with ECSA with 5 years related experience in the following:
  - Heating, Ventilation and Air Conditioning Systems

**CONTROLLED DISCLOSURE**

- Wet services i.e., potable and fire systems

Resource has a formal engineering degree (or equivalent qualification) in the relevant engineering discipline

i.e. BSc/BEng/BTech/Meng, with demonstrable experience in design of the aforementioned systems

- C&I Engineer/Technologist, professionally registered with ECSA with 5 years related design experience in the following:
  - Access control systems
  - Closed Circuit Television (CCTV)
  - Fire detection systems (SAQCC accreditation required)
  - Public address systems

**CONTROLLED DISCLOSURE**

- Draughtsperson to produce mechanical/civil/structural/architectural/C&I drawing designs, with 5 years draughting experience. Resource to have at least a Grade 12 qualification or equivalent.
- Planner with 3 years related experience in a technical field. Resource to have a Grade 12 qualification or equivalent
- Professional quantity surveying service provider/s, in good standing with SACQSP. Resource to have 5 years working experience in engineering projects

The *Consultant* notes that all project resources shall be compliant in terms of the Construction Regulation (2014) pertaining to competency, skills, responsibility and professional registration.

### **6.3 Site hours**

The *Consultant* notes the Employer's working hours. The *Consultant* takes due cognizance of the *Employer's* working hours whilst providing the service.

Monday – Thursdays: 07:00am – 16:15pm

Fridays: 07:00am – 12:00pm

## **7 Documentation control and retention**

### **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 the supply of all documentation during the various project stages.

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.

Each revision of a document or drawing shall be accompanied with a list of comments made by the

**CONTROLLED DISCLOSURE**

*Employer* on previous revisions, if applicable. The responses/corrective actions taken by the *Consultant* 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 *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:

- a) Document title
- b) Document unique identification number (Eskom number)
- c) *Consultant* document number, if applicable
- d) Document status
- e) Revision number
- f) Document type
- g) Document revision table/history
- h) Page number on the footer
- i) Document author/authorizer
- j) Document originator

The following additional attributes are important for technical documents:

- a) Package/system name/sub-system name
- b) Unit number
- c) *Consultant* name
- d) Contract number
- e) 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.

### Layout and Typography

Every document should comply with the following font specifications:

- a) Font Colour: Black
- b) Main Headings Font Type: Arial, Bold, Capital Letters
- c) Main Heading Font Size: 12pt
- d) Subheadings Font Type: Arial, Bold, Title Case
- e) Subheadings Font Size: 11pt
- f) Body Font Type: Arial, Sentence Case i.e., only the first letter of the first word is a capital letter.
- g) Body Text Font size: 11pt
- h) Line Spacing: 1.5 line spacing.

**CONTROLLED DISCLOSURE**

- i) Margins: Standard
- j) Alignment: Full justification to be used
- k) Paragraphing: One line skip between paragraphs
- l) Pagination: Centred page numbers (about 0.5 inches from bottom)
- m) 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.FileEx  
tention)

For documents that do not necessarily require the 'Approved Date' and 'Revision & Versioning',  
use the date of update:  
(YYYYMMDD\_DocType\_DocumentTitle\_UniqueIdentifier\_Revision.FileExtension)

### Document Submissions

The *Consultant's* program allows 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.

All documentation submitted by the *Consultant* is accompanied by a transmittal note.

### Information Requirements

The *Employer* requires information and data from the *Consultant* for management and execution of the Contract as well as the operation, maintenance, and support of the *works*. The *Consultant* to supply all information required in terms of the Contract including all information necessary for:

- a) Design reviews and interface management of the *works*,
- b) Quality assurance and control,
- c) Operations, maintenance, training etc.

The scope of supply of information from the *Consultant*, to include the following but not limited to:

### CONTROLLED DISCLOSURE

**Table 4: Typical Document Requirement List (As-built) (where applicable)**

Document Group	Description of document type (includes information data sets)
General	Equipment arrangement drawings Piping & Instrument Diagrams (P&ID's) 3D model Equipment list Isometric Drawings Valve list Pipeline list Hanger list Equipment specifications & data sheets Drawings and data for all equipment and material Installation, Operation, and Maintenance (IOM) Manuals
Civils & Structures	Site layouts Architectural drawings Structural drawings Drainage layouts Foundation drawings Access platforms Geotechnical report Survey report Design reports Assessment reports
Operations	Operating procedure Maintenance procedures and schedules Operating and maintenance manuals Etc.

**CONTROLLED DISCLOSURE**

Document Group	Description of document type (includes information data sets)
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 Etc.
Training	Training plan Training manuals and instructions Etc.
Safety & Protection	Fire hazard analysis Waste management plan Etc.
Design Analyses	Reliability model and analysis Air flow analysis and schematics Heat load calculations HVAC equipment sizing calculations Transient / Transition Analysis Flow dynamics analysis Thermo-hydraulic analysis Pipe Stress Analysis Maintainability analysis FMECA / FMEA analysis HAZOP analysis 3D model interference checks Etc.

**CONTROLLED DISCLOSURE**

Document Group	Description of document type (includes information data sets)
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 Cabling routing and cable racking layout diagrams Cable termination diagrams EMC and earthing standards report Earthing layout drawings Lighting layout drawings Design reports Etc.
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

**CONTROLLED DISCLOSURE**

In addition to the official documentation submittals listed, the *Consultant* shall provide additional information for review and design coordination as requested by the *Employer* from time to time.

The *Consultant* shall use the *Employer's* SmartPlant Environment and all design tools as the delivery mechanism for all project data and document deliverables. The EDMS and design tools shall be provided to the *Consultant* pre-configured based on *Employer's* data handover requirements. Any project data and document deliverables not generated from design tools provided by the *Employer* shall be supplied in a format specified by the *Employer*.

## 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 *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.

## Retention of documents

The *Consultant* retains copies of drawings, specifications, reports and other documents which record the *services* for a minimum period of five (5) years.

## The Parties use of material provided by the *Consultant*

The *Consultant* notes that all his design data, that is presented to the *Employer* in relation to the *service*, become the property of the *Employer*. The *Employer* has total rights to use the *Consultant's* designs, as the *Employer* requires i.e., construction, refurbishment, repair, maintenance etc.

## 8 Other Requirements of the *Consultant's* Design

### 8.1.1 Construction & Commissioning Monitoring

#### Construction & Commissioning Monitoring Including Engineering Support

- The *Consultant* provides construction and commissioning monitoring *services* in accordance with Level 3 of the ECSA Guideline Scope of Services and Professional Fees for Registered Persons [Engineering Profession Act, 46 of 2000]. The *service* includes the provision of on-site personnel during construction and commissioning activities, as deemed necessary by the *Consultant*. These services shall be required for the duration of the construction and commissioning works. The duties of the *Consultant* include the following but not limited to:
  - Maintain a full-time presence on site for purposes of performing the service. The *Consultant* makes available all resources necessary to conduct the service
  - Perform technical oversight and assurance i.e., provide design/technical clarifications and support

**CONTROLLED DISCLOSURE**

including but not limited to the review of construction work procedures, repair methodologies, quality control plans, material samples and/or construction material, survey results, requests for information, concessions, data books etc. The *Consultant* attends technical meetings and provides input to Engineering Changes/Modifications and Engineering Responses

- Respond to technical queries raised by executing contractor/s during construction and commissioning execution
  - Provide the executing contractor with updated design documentation etc. where changes to the design/s are required
  - Attend site meetings (technical, quality assurance, construction progress)
  - Management of project interfaces with other discipline engineers, construction contractor etc.
- The *Consultant* performs inspection and testing activities, other than on site, of materials and plant, including inspection and testing during manufacture.
  - If required, the *Consultant* conducts follow up geotechnical studies to confirm the current site conditions
  - The *Consultant* co-ordinates and monitors rectification of defects

#### Functional and Value-Add Design Changes

Proposed design changes are performed prior start of the *works*, by the *Consultant*. The design changes are classified as “Functional” or “Value-Add” changes. Functional changes are driven by changes to design functionality to address design flaws, omissions and/or deficiencies. Value-add changes primarily focus on cost and time reductions through design efficiency. Engineering design changes that arise during construction are catered for separately by the *Consultant*.

The *Consultant* makes provision for a minimum of 200 hours of Engineering Design Support and 150 hours for Draughtsperson Support for “Functional Changes” as defined above. These hours will be used on an as-required basis based on the outcome of the design review of existing design data. The *Consultant* obtains approval from the *Employer* before making use of the allocated hours. These hours are over and above the hours provided for by the *Consultant* for changes required during construction as a result of contractor queries etc.

The *Consultant* makes provision for a minimum of 200 hours of Engineering Design Support and Draughtsperson Support for “Value-Add Changes” as defined above. These hours will be used on an as-required basis based on the outcome of the design reviews. The *Consultant* obtains approval from the *Employer* before making use of the allocated hours. These hours are over and above the hours provided for by the contractor for changes required during construction as a result of contractor queries etc. The *Consultant* provides motivations, in the form of a Technical Report, any proposed engineering design modifications, as well as the time and cost implications of such changes. Only changes that will prohibit the *Consultant* from issuing Statutory Certification and/or Completion Certificates, changes that impact execution of the works or changes that will have significant value-add impact for the *Employer*, will be considered for acceptance by the *Employer*.

In addition, the *Consultant*'s duties include the following:

- Undertake duties resulting from project scope changes, alterations and/or instructions by the *Client*, requiring the *Consultant* to advise, review, adapt and/or alter designs and/or other documentation of the project scope. This is applicable for all works forming part of the project scope

#### CONTROLLED DISCLOSURE

- All designs, design reports and construction drawings prepared by the *Consultant* are signed off by a professionally registered Architect, Engineer or Technologists who take full professional accountability for their designs.

### **As-built Drawings and Documentation**

The *Consultant* shall manage and prepare record drawings/as-built drawings and documents, related to designs done by others and/or related to alterations and additions of existing works. The *Consultant* is required to manage and complete all drawings forming part of the project scope i.e. Architectural, Civil & Structural, Mechanical and C&I drawings. The designs to embody all modifications made during construction. The *Consultant* notes that 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. The *Consultant* also notes that the design DGN files will be issued by the Employer at contract award stage.

### **Operating Manuals and Maintenance Schedules**

Where required, The *Consultant* shall prepare and submit operating and maintenance manuals (O&M) for plant, equipment, systems and installation items under this contract. The manuals shall provide a detailed record of the safe operation and maintenance of the items. The *Consultant* submits the documentation to the *Employer* for review and acceptance. The *Consultant* submits the O&M manuals prior undertaking test and commissioning activities.

The manuals shall provide comprehensive information on the following but not limited to:

- a) Equipment technical data
- b) Detailed drawings of equipment items
- c) Operating procedure of equipment items
- d) Prescribed maintenance schedule or routine maintenance procedures/instructions per manufacturer requirements
- e) Commissioning procedures
- f) Preservation and storage requirements

### **Statutory Certification**

The *Consultant* issues statutory certification and certificates of compliance for new works or portions of works forming part of the scope of *services*. The *Consultant* ensures that any work approved or certified by them, has been reviewed or inspected to the extent necessary to confirm the correctness of the approval or certification. Furthermore, the *Consultant* issues statutory certification for structural, fire protection and electrical systems and any other applicable systems or components forming part of the works, to certify that the installation, erection or construction of the systems has been approved in terms of section 14(2A) of the National Building Regulations and any other applicable codes of practice. The persons who issue such certification assume full liability and responsibility for such installation, erection or construction.

## **8.2 Surveying and Setting Out of the Works**

- a) The *Consultant* is responsible for the complete surveying and setting out of the *works* including establishment and protection of any benchmarks required to complete the *works*.

**CONTROLLED DISCLOSURE**

- b) The *Consultant* is required to submit as-built and/or red-line data and drawings of the completed *works* to the *Project Manager* upon handover. As-built drawings are submitted in PDF and native CAD (.DGN) formats.
- c) The *Consultant* is responsible for the verification of all survey data relating to setting out and to immediately inform the *Project Manager* of any discrepancies as soon as these are discovered.
- d) The final position of the new infrastructure i.e., ablution block, guardhouse, potable and fire water infrastructure is determined by the *Consultant* with the ideal location indicated on the issued drawings.

### 8.3 Excavations and Associated Water

#### Control Excavations & Scanning of

##### Underground Services

No excavations are permitted without an excavation permit obtained from the *Project Manager*. The *Consultant* complies with the requirements of the Construction Regulations, Execution of Site Preparation and Earthworks [19] and the Kusile Trench and Excavation Procedure [203-13626]. Scanning of underground services shall precede all excavation works. The *Consultant* performs geophysical assessments for detection of subsurface utilities, prior undertaking excavations. The geophysical scanning method employed is at the discretion of the *Consultant*. The *Consultant* therefore considers the work area prior to selection of test methodology and equipment. The *Consultant* submits the results of the scans to the Project Manager and indicates possible services which may interfere with the works. The *Consultant* shall obtain all relevant drawings, indicating the position of potential underground services around the work area. Care shall be taken by the *Consultant* to properly demarcate and protect all underground utilities. If any service or structure is damaged by the *Consultant*, that should have been located or protected by the *Consultant*, the *Consultant* shall be liable for the repair works.

### 8.4 Temporary Works

The *Consultant* is responsible for the design of all temporary works and is mandated in terms of Construction Regulations 2014: Duties of Designer, 6(2) a – d, to fulfil the duties described therein for all temporary work designs.

### 8.5 *Consultant* 's Programme

The *Consultant* submits for acceptance, an integrated and detailed programme within the time period set out in the Contract Data and whenever a programme is amended or revised. The programme includes timing of operations of his subconsultants. The *Consultant* submits an electronic copy of his programme in MS Project (MPP) format. The programme shall, inter alia, include:

- a) the order and timing of operations by the *Consultant* and any other actions required of the *Employer* and others;
- b) the planned completion date of the services

**CONTROLLED DISCLOSURE**

- c) provisions for float;
- d) other information as required in terms of the Scope of Work or Contract Data.

#### 8.5.1 Submission Of Revised Programmes and Progress Reporting

The *Consultant* submits his revised programme on a monthly basis, unless otherwise stated in the Contract data or as instructed by the *Employer*. The *Consultant* indicates on each revised programme:

- a) Actual progress achieved on each operation and reprogramming of future operations, if necessary
- b) Management of delays encountered etc.

#### 8.5.2 Progress Reporting

The *Consultant* submits to the Employer a monthly report by no later than the last day of the month. The reports contains the following information as a minimum;

- Executive summary of overall project progress
- Project programme indicating actual work progress against accepted programme for all disciplines. Reporting on deviations from plan and recovery plans
- Project risks
- A four (4) week look ahead
- Early warning log
- Compensation event log
- Finance and cost controlling etc.

### 8.6 Quality management

#### 8.6.1 System requirements

The *Consultant* and his *subconsultants* adhere to the provisions and requirements of ISO 9001 when providing the service.

##### 1. Plant Codification

Plant Coding shall be undertaken by the *Consultant*. The *Employer* will assign a technician who will interact with the *Consultant* to assist with this process. The *Consultant* is required to include allocated codes to all design documentation.

The KKS system shall be used for classifying and designating both plant and related documentation. The *Consultant* complies with the requirements of the technical documentation classification and designation standard [240- 54179170]], Eskom Hybrid Coding Standard [240-131050729], publication KKS power plant classification (B105e) 5th Edition 2003 and the KKS Applications: Guideline and explanations A, B1-4 (B106e) etc.

**CONTROLLED DISCLOSURE**

All maintainable plant shall be coded up to KKS breakdown level 3 (i.e., Mechanical, Electrical, C&I and Civil systems)). Omissions or deviations from the latter requirements shall not be permitted without approval from the *Employer*.

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.

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

The *Consultant* shall code all plant within the scope of *service*. KKS codes shall appear on all plant related documentation, drawings, lists and correspondence.

The *Consultant* shall be responsible for ensuring accuracy, completeness, and consistency of all plant and document designations.

### **Project Deliverables**

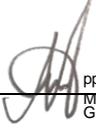
The *Consultant* shall be responsible for the handover of all *Works* associated with the contract. The handover submissions shall include but not limited to the following:

- a) Assessment reports
- b) Detailed design reports for entire *Works*. Report to be signed off by an ECSA Professionally Registered Engineer (civil/structural, mechanical, electrical, C&I packages)
- c) Approved construction drawings for the entire *Works* signed off by an ECSA Professionally Registered Engineer (civil/structural, mechanical, electrical, C&I packages)
- d) As-built drawings and all handover documentation is required to be submitted within 6 weeks of construction completion. (civil/structural, mechanical, electrical, C&I packages)
- e) Bill of quantities for construction (civil/structural, mechanical, electrical, C&I packages)
- f) PECs and/or CoCs for completed *Works* is required to be submitted within 6 weeks of construction completion
- g) Geotechnical investigation and survey reports
- h) All construction supervision related documentation as detailed in this scope document. (civil/structural, mechanical, electrical, C&I packages)

### **CONTROLLED DISCLOSURE**

## 9 Acceptance

This document has been seen and accepted by:

Name	Designation	Signature
Dhiresb Ram	Mechanical Engineer – Fire Protection System	 pp Masande Gomomo
Harold Marobane	C&I Engineer	p.p. Dale
Kunaal Dharamraj	Mechanical Engineer – HVAC System	
Vely Sondezi	Electrical Engineer	 pp
Nhlanhla Rikhotso	Senior Engineer – Potable Water System	

## 10 Revisions

Date	Rev.	Compiler	Remarks
July 2025	1	L. Thipa	New Document

## 11 Development Team

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

Dhiresb Ram  
Philani Myeni  
Harold Marobane  
Kunaal Dharamraj  
Vely Sondezi  
Nhlanhla Rikhotso

## 12 Acknowledgements

Aluwani Maumela

**CONTROLLED DISCLOSURE**