

	<b>Specification</b>	<b>Technology</b>
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Title:	<b>Technical Specification for the design and construction of Auxiliary Buildings at the Medupi Power Station</b>	Unique Identifier:	<b>348-9948426</b>
		Alternative Reference Number:	<b>N/A</b>
		Area of Applicability:	<b>Engineering</b>
		Documentation Type:	<b>Specification</b>
		Revision:	<b>3</b>
		Total Pages:	<b>95</b>
		Next Review Date:	<b>N/A</b>
		Disclosure Classification:	<b>CONTROLLED DISCLOSURE</b>

<b>Compiled by</b>	<b>Functional Responsibility</b>	<b>Authorised by</b>
.....	.....	.....

Date: 2023/08/18	Date: .....	Date: .....
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## 1. INTRODUCTION

1. Medupi Power Station is situated near Lephalale in Limpopo Province. The station is constructed close to the Matimba Power Station adjacent to the Exxaro coal mine.
2. The scope entails the design, construction, commissioning, and handover of the following 3 new auxiliary structures:
  - a. Document Storage Building
  - b. Fire and Medical Storeroom
  - c. Secondary Clarifier Substation
3. The above structures will provide storage space as well as electrical services to the Medupi Power station and is to be designed and constructed for a 50-year design life.

## 2. SUPPORTING CLAUSES

### 2.1 SCOPE

1. This serves to provide information to the *Contractor* for the scope of works and technical specifications required for the multidisciplinary scope as listed below, of the three new structures.
  - a. Design
  - b. Construction
  - c. Construction Monitoring
  - d. Supply
  - e. Fabrication
  - f. Installation and testing
  - g. Professional certification
  - h. Commissioning and handover
2. The *Contractor* is to deliver fully functional and compliant structures as defined in this technical specification.

#### 2.1.1 Purpose

1. The purpose of this document is to provide the scope of work and technical specifications for the design and construction of the listed structures below:
  - a. Document Storage Building
  - b. Fire and Medical Storeroom

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c. Secondary Clarifier Substation

### 2.1.2 Applicability

1. This document shall apply to Medupi Power Station only.

## 2.2 NORMATIVE/INFORMATIVE REFERENCES

1. Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs. Caveat: listed documents are not exhaustive.

### 2.2.1 Normative

#### GENERAL

- [1] Occupational Health and Safety Act (Act 85 of 1993) with associated Regulations
- [2] 200-35208 - Environmental Management Plan
- [3] National Environmental Management Act, 1998 (Act 107 of 1998)
- [4] National Environmental Management Waste Act, 2008 (Act 59 of 2008)
- [5] National Water Act, 1998 (Act 36 of 1998)
- [6] Government Notice 704, National Water Act 1998
- [7] The Environmental Conservation Act (Act No 73 of 1989)
- [8] South African National Standards (SANS), relevant and applicable
- [9] National Building Regulations and Building Standards Act No. 103 Of 1977
- [10] 240-53113685 - Design review procedure
- [11] 200-1689 - Medupi Quality Specifications
- [12] 240-86973501 - Engineering Drawing Standards – Common Requirements
- [13] SSZ\_45-17 - Medupi Power Station Corrosion Protection Specification
- [14] 240-84711933 Medupi Power Station Fossil Fuel Firing Regulations Instruction
- [15] 240-105827236-1 Medupi Power Station Application for Camera Usage
- [16] 240-114967625 Operating Regulations for High Voltage Systems
- [17] 240-150642762 Generation Plant Safety Regulations

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[18] 348-711703 (SSZ 200-207219) Medupi Power Station Safety, Health and Environmental Specification

[19] 240-53114002 Engineering Change Management Procedure

### **STRUCTURAL & CIVIL**

[20] 240-56364545 Structural Design and Engineering Standard

[21] 200-42826 Criteria for Blasting Vibration

[22] 240-57127955 - Geotechnical and Foundation Engineering Standard

[23] 240-57127951 – Standard for the Execution of Site Investigations

[24] 240-57127953 – Execution of Site Preparation and Earthworks Standard

[25] 200-16817 - Excavation permit Application Procedure

[26] 240-85549846- Standard for Design of Drainage and Sewerage Infrastructure

[27] 348-880042 Medupi Concrete specification for structural concrete (84CIVL053)

[28] 200-6166 - Medupi Power Station Backfill Specification

[29] SANS 1200 complete series

[30] SANS 2001 CC1 complete series

[31] 200-26680 – Medupi Power Station Architectural Technical Specification for Structures & Other Buildings

[32] 84civl007 – Architectural Concept

[33] 240-52599753 Workplace space and furniture standard for commercial properties

[34] SANS 10400 – South African National Standards complete series

[35] 200-4056 - Power Station Architectural Technical Specifications for Structures and other Buildings

### **MECHANICAL**

[36] 240-126468603 Operational Standard for Fire Management in Generation

[37] 240-54937450 Fire Protection and Life Safety Design Standard

[38] 240-56356376 On-Site Commissioning for Low Pressure Systems Standard

[39] 240-105020315, Standard for Low Pressure Valves

[40] 240-106628253, Standard for Welding Requirements on Eskom Plant

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- [41] 240-123801640, Standard for Low Pressure Pipelines
- [42] 240-61227631 Piping and Instrumentation Diagram (PID) Standard

#### **ACCESS CONTROL AND FIRE DETECTION SYSTEM**

- [43] 240-56355466 – Alarm Management System Guideline
- [44] 240-56737448 – Fire Detection and Life Safety Design Standard
- [45] 240-54937439 Fire Protection/Detection Assessment Standard
- [46] 240-56737450 Fire Protection and Life Safety Design Standard
- [47] 200-63065 – Fire Detection Requirements for Medupi Power Station.
- [48] SANS 10139 – Fire System Design

#### **ELECTRICAL**

- [49] 240-56227516 - LV Switchgear Control Gear Assembly Associated Equipment for Voltage 1000V AC and 1500V Standard
- [50] 240-56227443 - Requirements for Control and Power Cables for Power Station Standard
- [51] 240-56356396 - Earthing and Lightning Protection Standard
- [52] 240-55714363 - Eskom Generation Power Stations Lighting and Small Power Installation Standard
- [53] 240-56176852 - Essential Power Supplies for Power Stations Standard
- [54] 240-56355815 - Junction Boxes and Cable Termination Standard
- [55] SANS 10142-1 - The wiring for premises Part 1: low-voltage installations.
- [56] SANS 10114-1 - Interior lighting Part 1: Artificial lighting of interiors
- [57] SANS 10114-2 - Interior lighting Part 2: Emergency lighting
- [58] IEEE 80 Guide for Safety in AC Substation Grounding
- [59] SANS 204: Energy Efficiency in Buildings

#### **CONFIGURATION MANAGEMENT**

- [60] KKS Coding and Labelling Standard KKS01-200-3340
- [61] Medupi Power Station List of Abbreviations – 348-885912
- [62] Issuing of KKS Certificates Work Instruction – 200-94660
- [63] KKS Coding Standard -240-93576498

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- [64] KKS Key Part Standard -348-694071
- [65] Application of KKS Plant Coding PZ 200-4190

### **2.2.2 Informative**

#### **GENERAL**

- [66] ISO 9001 Quality Management Systems
- [67] ISO 14001:2015 Environmental Management Systems
- [68] Occupational Health and Safety Management Systems Requirements (OHSAS 18001)
- [69] 200-46362 - Site Inspections Procedure
- [70] 200-15406 - Issue Takeover Certificate
- [71] 200-11303 - Medupi Occupational Health, Safety and Management Policy
- [72] 32-421 - Eskom Life Saving Rules
- [73] PWI 200 – 5664: Engineering Change Management Work Instruction
- [74] 240-103414344 - Summary of corporate identity manual
- [75] 348-860842 Manufacturing Inspection and Testing Work Instruction

#### **STRUCTURAL & CIVIL**

- [76] SANS 3001-C03-1 Part CO3-1: Concrete durability index testing — Preparation of test specimens
- [77] SANS 3001-C03-2 Part CO3-2: Concrete durability index testing — Oxygen permeability test
- [78] SANS 3001-C3-3 Part CO3-3: Concrete durability index testing — Chloride conductivity test
- [79] Policy ESK PB AAQ 3 - Interior Specifications for Eskom
- [80] PROJECT ALPHA: REPORT ON GEOTECHNICAL INVESTIGATIONS AT THE POWER STATION SITE, VOLUME 1

#### **CONFIGURATION MANAGEMENT**

- [81] ISO 10007 Configuration Management
- [82] VGB – B 106 E Part A– KKS Application Commentaries Part A – General
- [83] VGB – B 106 E Part B1 – KKS Application Commentaries Part B1\_ Mechanical Engineering
- [84] VGB – B 106 E Part B2 – KKS Application Commentaries Part B2 - Civil Engineering
- [85] VGB – B 106 E Part B3 - KKS Application Commentaries Part B3\_Electrical and C&I Engineering

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[86] VGB-S-811-01-2018-01-EN (eBook -VGB-OM)

## 2.3 GENERAL DEFINITIONS

Definition	Description
Bulk filer	Storage unit in which hard copy documentation such as data books will be housed
<i>Contractor</i>	Refer to Construction Regulations section 1 “Definitions” for technical definition.
Design	Refer to Construction Regulations section 1 “Definitions” for definition.
Designer	Refer to Construction Regulations section 1 “Definitions” for definition.
<i>Employer</i>	Eskom, or Eskom Medupi Power Station or representative
Pipework	Pipes and fittings used for the conveyance of fuel, water, gases or other fluids.
Piping	Pipes, tubes, or flexible pressure hose elements intended for the transport or distribution of any fluid.
Professional Engineer	Refer to Construction Regulation section 1 “Definitions” for definition.
Professional Engineering Certificate	Certificate issued by the Professional Engineer/Technologist
Professional Technologist	Refer to Construction Regulation section 1 “Definitions” for definition.
Pump	A pump is a device that moves a fluid by mechanical action.
System	An integrated set of constituent pieces that are combined in an operational or support environment to accomplish a defined objective. These pieces include people, hardware, software, firmware, information, procedures, facilities, services, and other support facets.
Valve	A device for shutting-off or controlling the flow of a fluid through a pipe or duct.

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### 2.3.1 Disclosure Classification

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

### 2.4 ABBREVIATIONS

No.	Abbreviation	Description
1	AFFF	Aqueous Film Forming Foam
2	C&I	Control and Instrumentation
3	CAR	Corrective Action Request
4	CBMS	Consolidated Building Management System
5	CCTV	Close Circuit Television
6	CM	Configuration Management
7	COC	Certificate of Compliance
8	DC	Direct Current
9	ECSA	Engineering Council of South Africa
10	EDWL	Engineering Design Work Lead
11	FAT	Factory Acceptance Test
12	FM	Factory Mutual
13	HMI	Human Machine Interface
14	HVAC	Heating Ventilation and Air Conditioning
15	IP	Ingress Protection
16	ITP	Inspection and Test Plan
17	KKS	Kraftwerk-Kennzeichensystem
18	kPa	Kilo Pascal
19	LDE	Lead Discipline Engineer
20	LV	Low Voltage
21	m	Meter(s)
22	m/s	Meter per second

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No.	Abbreviation	Description
23	mA	Milli Amp
24	MDL	Master Document List
25	MPI	Magnetic particle inspection
26	MV	Medium Voltage
27	NB	Nominal Bore
28	NDT	Non-destructive testing
29	NKP	National Key Point
30	O&M	Operating and Maintenance
31	OEM	Original Equipment Manufacturer
32	OHSA	Occupational health and Safety Act
33	P&ID	Process and Instrumentation Diagram
34	PBS	Plant Breakdown Structure
35	PEC	Professional Engineering Certificate
36	PPE	Personal Protective Equipment
37	PVC-M	Modified Poly Vinyl Chloride
38	QA	Quality Assurance
39	QC	Quality Control
40	QCP	Quality Control Plan
41	QMS	Quality Management System
42	SABS	South African Bureau of Standards
43	SANS	South African National Standards
44	SCBA	Self-Contained Breathing Apparatus
45	SHE	Safety, Health & Environmental
46	SHEQ	Safety Health Environmental and Quality
47	SOW	Scope of Work
48	SPO	Smart Plant Operator Document Management System

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No.	Abbreviation	Description
49	TAC	Transverse Ash Conveyor
50	UL	Underwriters Laboratories
51	V	Volts
52	VDSS	Vendor Document Submittal Schedule

## 2.5 GENERAL ROLES AND RESPONSIBILITIES

1. The following roles and responsibilities apply:

Person	Technical Responsibility
a. <i>Contractor</i>	The <i>Contractor</i> shall be responsible for the duties as defined in section 6, "Duties of designer", as well as section 7, "Duties of the <i>Contractor</i> " of the Construction Regulations and all duties as defined by Contract data.
b. Engineering Design Work Lead (EDWL)	He/she co-ordinates the design work provided by the discipline Design Engineering roles and integrates this work into a final integrated design product. He/she is the custodian of the requirements set and the interface register between packages and part of his/her role is to maintain this information. He remains responsible for the integrity of the engineering product and is accountable for the overall management of interfaces and delivery of an integrated product.
c. Lead Discipline Engineer (LDE)	The role of the Lead Discipline Engineering role is to manage the technical integrity of the design and be accountable for the management of the interfaces within their specific engineering domain
d. Site Construction Engineering Practitioner	The Site Construction Engineering role is part of the project engineering team and participates in

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	<p>conjunction with other team members of all disciplines to assure the technical integrity of a fully functional and operational plant that meets the user requirement and Eskom Engineering expectations and requirements. The Site Construction Engineering role is a key link to facilitate and ensure that the plant, is built and commissioned, is fully aligned with the Design Base, Operating Technical Specifications, and the Maintenance Base. The role provides an assurance function.</p> <p>Quality inspections, Final acceptance, sign-off and acceptance</p>
e. <i>Contractor's Designer</i>	<p>Refer to Construction Regulations section 6 "Duties of the Designer".</p> <p>For Civil and Structural engineering and Electrical engineering applications the duties of the designer, as defined in the Construction Regulations, shall be assigned to the Professional Engineer\Technologist.</p>
f. Architect	<p>The Architect is responsible for the conceptual and detailed design of the building, the specification of finishes and the submission of plans for acceptance, ensuring compliance with <i>Employer's</i> planning requirements and national building regulations.</p>
g. <i>Project Manager</i>	<p>The <i>Project Manager</i> is the delegated authority from the <i>Employer</i> representing the <i>Employer</i> to manage the defined scope of work. The <i>Project Manager</i> coordinates the execution of the Works to achieve the required cost, schedule, and quality objectives.</p>

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	The <i>Project Manager</i> is Eskom's representative(s) that officially communicates with the <i>Contractor</i>
h. Quality Management	Quality ensures <i>Contractors</i> build plant according to contractual specifications, and user requirements and codes. Quality is the custodian of the Quality Management System and quality records and facilitates the work of the Approved Inspection Authority (AIA). The Quality Function's responsibility is to ensure <i>Contractors</i> have a sound quality system in place. Quality checks these systems on behalf of the <i>Employer</i> .

## 2.6 PROCESS FOR MONITORING

Not Applicable

## 2.7 RELATED /SUPPORTING DOCUMENTS

Not Applicable

## 3. GENERAL SHEQ REQUIREMENTS

1. The *Contractor* shall comply with the latest revision of, including but not limited to, the Eskom Generation Plant Safety Regulations, site specific procedures and stipulations of the OHS Act and SANS requirements. The *Contractor* shall ensure:
  - a. Compliance with all requirements of the Occupational Health and Safety Act no 85 of 1993 and its regulations to ensure the health and safety of persons carrying out the *Works*.
  - b. Compliance with Eskom's SHE policies, procedures, standards, guidelines, specifications, and site regulations.
  - c. All employees are medically, physical, and psychologically fit to perform the *Works*. Employees shall have a valid medical certificate of fitness specific to the work to be performed.
  - d. All employees undergo the relevant training as per their function requirement.
  - e. All employees working at heights must be in possession of valid training certificates

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- f. Employees are informed of hazards identified in the risk assessment before commencement of *Works*. The Method Statement shall also be communicated to the employees on this work activity before commencement of *Works*.
  - g. The emergency rescue plan shall also be communicated to personnel undertaking the *Works*
  - h. Prevention of risk and threats as reasonably practical. All safety and health related incidents should be reported as soon as possible but before end of shift and managed as per Incident management procedure 32-95
  - i. Sufficient health and safety information as well as resources are made available
  - j. All employees undergo safety induction on-site
  - k. All power tools will be inspected, and colour coded as and when required.
  - l. Prescribed PPE for the specified *Works* shall be always worn. The provision of PPE shall be the responsibility of the Contractor.
  - m. Correct site drawings are obtained and communicated to the employees undertaking the *Works*
  - n. All legal appointments should be done in writing and have relevant competency.
  - o. All necessary precautions are taken to manage COVID-19 on-site.
  - p. That letter of good standing shall be always valid. The letter of good standing shall reflect the name of the *Contractor*.
- 2. Contractors shall comply with the Projects' Environmental Management Plan (EMP), Environmental Authorisations, Licences, permits and other current related requirements.
  - 3. Contractor must ensure that the Method Statements are submitted to the *Project Manager* for approval before any work is undertaken. Any lack of adherence to this will be considered as non-compliance to the specifications.
  - 4. Contractor must ensure that any instructions issued by the Engineer, on the advice of the *Project Manager*, are adhered to.
  - 5. Contractor must maintain the environmental legal register.
  - 6. Contractor must develop the environmental file and submit for approval by project environmental team prior commencement of works on site.
  - 7. The *Contractor's* ECSA registered professionals (Professional Engineer\Technologist) shall comply with the *Rules of Conduct for Registered Persons: Engineering Act, 2000 (Act No. 46 of 2000)*, with specific reference to *Public Interest* and *Environmental*.

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#### 4. DESCRIPTION OF THE *EMPLOYER'S* DESIGN SCOPE

1. The *Employer's* architectural and electrical concept design diagrams\drawings are provided, for information only, for the following buildings:
  - a. Fire and Medical Storeroom
  - b. Secondary Clarifier Substation.

#### 5. OVERVIEW OF THE *CONTRACTOR'S* DESIGN AND CONSTRUCTION SCOPE

1. The scope of work for the project entails engineering and architectural design, construction, supply and construction supervision, construction monitoring by design professionals, installation, commissioning, and certification of the:
  - a. Document Storage Building
  - b. Fire and Medical Storeroom
  - c. Secondary Clarifier Substation
2. The *Contractor* shall consider value engineering and green building principles (taking into consideration environment sustainability for the design and construction of the above-mentioned buildings/structures).
3. All buildings shall be ergonomically designed and supplied in accordance with this scope.
4. The Contractor's Designer grants to the Employer an irrevocable, nonexclusive, royalty-free licence to utilize any intellectual property to the extent necessary for the operation, maintenance, repair or alteration to any works certified or that of the third party.

##### 5.1 LOCATION OF THE BUILDINGS

1. Figure 1 to 3 below provides an aerial view of the earmarked location for the new buildings. The *Contractor* shall base his/her design and construction methodology considering this information.
2. The Medupi Power Station site layout shall be shared with the *Contractor* once the contract is awarded.

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### 5.1.1 Document Storage Building location

1. The location of the Document storage building is depicted in Figure 1 below.



Figure 1: Document Storage Building location

### 5.1.2 Fire and Medical Storeroom location

1. The location of the Fire and Medical storage building is depicted in Figure 2 below.



Figure 2: Fire and Medical Storeroom location

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### 5.1.3 Secondary Clarifier Substation location

- The Secondary Clarifier Substation will be on the eastern side of the power station outside of the perimeter fence. The substation will be located on the western side of the clean and dirty dams. See Figure 3 below:

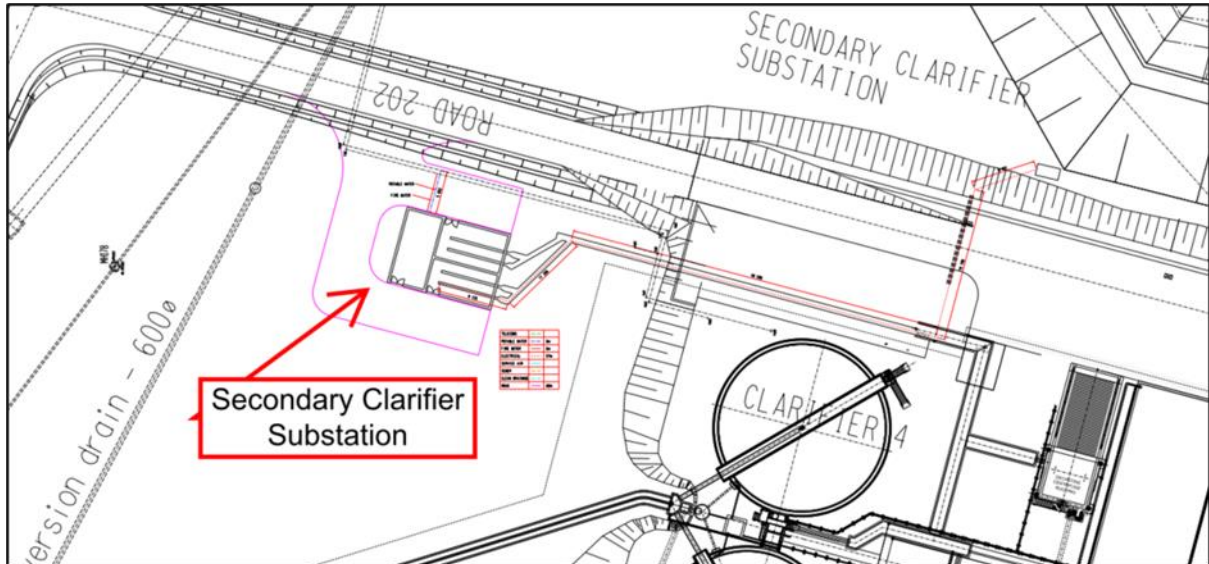


Figure 3: Secondary clarifier substation proposed location

## 5.2 BUILDINGS AND SYSTEMS OVERVIEW

- The Table 1 below provides a general overview of each of the buildings.

Table 1: Summary of Building Requirements

Description	Document Storage Building	Fire And Medical Storeroom	Secondary Clarifier Substation
Minimum floor area (m <sup>2</sup> )	800 for Bulk filer hall	250	140
Number of building storeys	1		
Storeroom minimum floor area (m <sup>2</sup> )	25	N/A	N/A
Roof type	Curved	Curved	Curved/Hipped
Roof covering	0.58mm Klip-lok 700		
Parking facility	Yes, 4 parking bays with 2 being paraplegic bays	Yes, 4 parking bays that will also cater for the offloading into building	No
Access Road and Terracing	Yes	Yes	Yes
Fencing	Yes, chiller yard only	No	Yes, chiller yard only

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Description	Document Storage Building	Fire And Medical Storeroom	Secondary Clarifier Substation
Fire Detection	To be defined by the fire rational design		
Fire Protection	Yes		
Small Power and Lighting	Yes		
Earthing and Lightning Protection	Yes		
HVAC	Yes		

### 5.3 OVERVIEW OF *CONTRACTOR'S* DESIGN SCOPE

1. An overview of the design scope is provided below:
  - a. All civil and structural elements for all three structures (including architectural design, geotechnical investigation, roads and paving, parking areas and paved walkway areas, stormwater and internal drainage and tie in with existing services, as indicated in the scope of work).
  - b. All areas including kitchens, ablutions facilities, administrative\office areas, storerooms and, all other areas for supportive services and equipment as indicated in the scope of work.
  - c. HVAC system complete with structural supports.
  - d. Electrical supply and distribution (incl. earthing, lighting, and small power)
  - e. Potable water system.
  - f. Active and passive fire protection.
  - g. Fire detection.
  - h. Access Control.
  - i. 'Clear view' fencing only required for external chiller yards where applicable.
  - j. Any dirty effluent should be routed to the nearest dirty drain manhole.
  - k. All buildings to have apron slabs around to cater for stormwater runoff.
  - l. During the design and construction phase the *Contractor* shall make provision to perform a topographic survey before finalising detail design of the works.
  - m. Design integration to ensure functionality of the building and services.

#### 5.3.1 Procedure for submission and acceptance of *Contractor's* design

1. The design review process, as outlined in the Design review procedure - 240-53113685, shall be followed for the review and acceptance of all the design documents submitted by the *Contractor*.

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2. Interim design reviews shall be performed on a regular basis, as and when required, to ensure End-of-Phase design objectives are achieved accurately and timeously. End-of-Phase design reviews shall be performed at key milestones during the project design life cycle. Key milestones, as defined by the *Contractor*, shall be agreed between the *Project Manager* and the *Contractor's* designers, taking into consideration the stages of design reviews as per the Design review procedure.
3. The *Contractor* shall account for 14 calendar days review period for design drawings and design reports for each submission.
4. For all design changes the Project Engineering Change Management Procedure shall be used for implementation of these changes.

### 5.3.2 General design requirements – all works

1. All design work shall be compliant with, including but not limited to, the Employer's standards, specifications and other relevant codes listed under section 2.2 of this document.
2. All design work shall be compliant with, including but not limited to, relevant and applicable standards, codes of practice, regulations, and legislative requirements.

### 5.3.3 Design constraints due to limited available information

1. The following information, that could influence the design of some structural elements, were not available at the time of finalising this document:
  - a. Latest topographic survey. The *Contractor* shall make provision to perform a topographic survey before finalising detail design of the works.
  - b. Where specified, the details of racking systems to be installed
  - c. Requirements for the use of vehicles and forklifts to perform maintenance work and operational activities. The *Contractor* must include provision to finalise the use of vehicles and forklifts requirements with the *Project Manager* during concept and detained design stages.
2. Considering above listed design constraints the designer is advised to refer to SANS 10160-2 clause 9.3.2 that could assist the designer in making reasonable assumption during tender stage.

## 5.4 OVERVIEW OF CONSTRUCTION SCOPE

1. An overview of the construction scope, but not limited to, is provided below:
  - a. Civil and structural elements (including architectural, geotechnical works, roads and paving, parking and paved walkway areas, stormwater and tie in with existing services) for the three structures.

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- b. All areas as stipulated in the Functional Requirements.
  - c. Where applicable all lifting equipment and associated supports.
  - d. HVAC system
  - e. Potable Water Supply
  - f. Electrical supply and distribution (incl. earthing, lighting, and small power)
  - g. All building finishes
  - h. Biometric units, CBMS interface
  - i. Fire Detection System
  - j. Active and passive fire protection
2. The *Contractor* shall be responsible for the supply of all materials. This includes - the complete buildings (including Bulk filter units at the Document Storage Building), HVAC systems, Fire protection systems (passive fire protection and active fire protection), fire detection, small power and lighting, ablution and kitchen facilities, storage systems all as indicated in this scope or work.
  3. Where a material is specified in this document, the material supplied shall be exactly in accordance with the specification and/or similar approved. If the *Contractor* intends to use similar or equivalent materials the *Contractor* shall apply in writing to the *Project Manager* for acceptance thereof.
  4. The Works to be provided by the *Contractor* shall include, but is not limited to all scaffolding, site cranes, lifting equipment and construction vehicles and all required plant and all other resources to execute the scope. All excavations, earthworks and terracing as required; all signage required; any modifications required for the use of existing infrastructure; and all materials, facilities and samples required to perform inspections, tests, and commissioning as per the relevant statutory and regulatory standards and as per this Technical Specification.
  5. The *Contractor* shall perform all its duties in accordance with the Construction Regulations, Eskom procedures and specifications and including but not limited to, relevant SANS specifications, regulatory and legislative requirements.
  6. The *Contractor* shall include provision for all incidental works.
  7. The Employer has provided a list of equipment, furniture, and appliances to be utilised on the buildings. The Contractor shall make provision for detailed analysis of the requirements listed and allow for alternative proposals where necessary.

#### 5.4.1 Construction constraints

1. All buildings are to be constructed on the existing Medupi Power Station facility which is a National Key Point and is currently under operation as well as partially under construction, in demarcated areas.

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2. Access to areas that are in operation will only be granted upon obtaining the necessary permission to work in line with the following, as applicable: 240-84711933 Medupi Power Station Fossil Fuel Firing Regulations Instruction, 240-114967625 Operating Regulations for High Voltage Systems, 240-150642762 Generation Plant Safety Regulations, 348-711703 (SSZ 200-207219) Medupi Power Station Safety, Health and Environmental Specification
3. Medupi Power Station is a designated NKP, consequently permission will need to be obtained prior to site photography via 240-105827236-1 Medupi Power Station Application for Camera Usage) and when flying overhead within the NKP boundary.
4. In line with the Medupi Safety Induction, there may be occasional encounters with wildlife such as baboons, monkeys, snakes, etc. The *Contractor* shall remain observant and ensure that they manage the situation safely, whilst alerting the necessary personnel for assistance. All construction work is to be performed adjacent to, and in close vicinity of existing operational plant and associated activities. Sequencing of construction works, access to the various areas of construction and, other related matters shall be discussed and agreed with the Contracts Manager.
5. Site weather conditions
6. Underground and overhead services
7. Existing infrastructure and blasting vibration limits
8. Permit to Work Procedure
9. Fire system impairments as per the Operational Standard for Fire Management in Generation.

#### 5.4.2 Aboveground and Underground services

1. The Contractor is responsible for the scanning, surveying, and verification of all existing above and underground services that may interface with the new works. To assist the Contractor, Relevant drawings of known (visible and non-vision) services, to the best of Employers knowledge, will be issued to the Contractor once the *Employer* has awarded the contract. The information is intended to assist the *Contractor*. It remains the responsibility of the Contractor to make provision for scanning, surveying and verification of services affecting the works.

#### 5.4.3 Survey control and setting out

1. The *Contractor's* survey and setting out of the works shall be integrated with the Medupi Power Station existing survey control points.
2. The *Contractor* is responsible verifying all as-built details of existing interfacing works.
3. The *Contractor* is responsible for the setting out of all works.

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4. The official Medupi Power Station site layout shall be shared with the *Contractor* to use and verify that all services within allocated areas are incorporated into the design and construction of the new works.

#### **5.4.4 Excavation work, demolition work, and water control**

1. The *Contractor* is responsible for all excavation work, refer to 200-16817 Excavation permit procedure.
2. The *Contractor* is responsible for all demolition work (where required) as well as the control of water.
3. All the above works shall be performed by the *Contractor* in accordance with the Construction Regulations.
4. Where blasting is required, the *Contractor* shall appoint a blasting specialist to investigate and approve blasting design and methodology. These include but not limited to, the assessment of blasting vibration limits.
5. The *Contractor's* blasting design and methodology shall take into consideration existing structures/services and limit any damage to existing infrastructure. Any damage to existing infrastructure due to blasting activities shall be at the contractor's cost.
6. The *Contractor's* blasting specialist shall provide a risk assessment and risk mitigation measures to the *Project Manager* for acceptance.

#### **5.4.5 Sequences of construction**

1. The *Contractor* is responsible for sequencing of the works in accordance with the accepted program.
2. Sequencing of the works shall be discussed and agreed between the *Contractor* and the *Project Manager*.

### **5.5 CONSTRUCTION MONITORING AND PROFESSIONAL ENGINEERING CERTIFICATION OF THE WORKS.**

1. The *Contractor's* Professional Engineer\Technologist responsible for the design of civil and structural works is to provide construction monitoring on the works in accordance with the provision of normal and additional services as per "Guideline Scope of Services and Tariff of Fees for Persons Registered in terms of the Engineering Profession Act 2000", for construction monitoring of the execution of the works. Construction monitoring includes but not limited to:

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- a. Review a sample of each important work procedure and construction material and other technical submissions such as construction method statements, inspection and test plans and quality control and quality assurance plans.
- b. Attending site meetings and maintain adequate presence on the construction site to review samples of works and important completed work prior to enclosure or on completion as appropriate.
- c. Provide the *Project Manager* with technical interpretation of the plans and specification when required.
- d. General inspection of materials and equipment for compliance with the design documentation for adherence to National and International standards.
- e. Provides the *Project Manager* with updated design documentation (drawings and specifications) where changes are required to ensure integration with existing works and where design changes are required due to unforeseen site conditions.
- f. Prepares and, on completion of the works, provides the *Project Manager* with As-Built drawings and a final (updated) design report signed by the *Contractor's* registered professional person.
- g. Conduct a final inspection of the completed works prior to commissioning.
- h. Certifies the works as complete, that design intent is achieved during construction, and the works are safe for commissioning and use in accordance with the design specifications by issuing a completion certificate i.e., PEC, in terms of the Construction Regulations, 2014, Occupational Health and Safety Act 1993, SANS 10400.
- i. Provide hand over documentation as listed in section 14.

## 6. ENGINEERING DESIGN AND CONSTRUCTION, MATERIALS STANDARDS & WORKMANSHIP

1. The *Contractor* shall be responsible for the supply of all construction materials, HVAC systems, Fire protection systems (passive fire protection and active fire protection), fire detection, small power and lighting, ablution, and kitchen facilities.
2. All buildings shall be compliant with the following, but not limited to, Employer's specification/standards and national standard requirements:
  - a. 200-26680 – Medupi Power Station Architectural Technical Specification for Structures & Other buildings
  - b. 84civl007 – Architectural Concept
  - c. Policy ESK PB AAQ 3 – Interior Specification for Eskom
  - d. 240-103414344– Summary of corporate identity manual

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- e. SANS 10400 – all parts
  - f. Occupational Health and Safety Act (Act 85 of 1993) with associated Regulations
3. All electrical and lighting supply and cable tunnelling/trenches, terracing around the building and access to the existing roads, offloading area; drive in bay and necessary concrete ramps.

## 6.1 CODES & STANDARDS TO BE USED IN THE WORKS

1. The *Contractor* is required to adhere to the latest editions of the normative and informative references within this document and all SANS standards and Eskom specifications/standards mentioned throughout this document as well as other relevant and applicable standards, regulatory and legislative requirements.

## 6.2 INVESTIGATION AND SITE CLEARANCE – ALL WORKS

### 6.2.1 Geotechnical investigation

1. The *Contractor* is to carry out a geotechnical investigation for all the structures. Thereafter the *Contractor* shall design, construct, monitor and certify of all geotechnical works. During construction, the *Contractor* shall make provision to monitor and inspect activities such as ground water table movement, ground deformations and stresses in the soil. The improvement of subsoil properties may also be checked at different construction stages (where required). The *Contractor* shall furnish all necessary equipment and resources required to execute the works. All works to be carried out in accordance the relevant and applicable codes of practice and standards including but not limited to the SAICE Site Investigation Code of Practice, 2010 and Revised Guide to Soil Profiling for Civil Engineering purposes in Southern Africa” Trans. S.A.I.C.E, Vol. 15. The works comprises of but not limited to:
- a. In-situ testing – layouts of test pits to be provided by *Contractor* for acceptance by the *Project Manager*. In-situ testing shall include test pits, excavation and sampling and soil/rock profiling. Such work to be performed under the supervision of the *Contractor’s* Geotechnical Engineer. The following tests, including but not limited to, are also required to be performed on site – DCP Tests, Ground water seepage and Water Table assessment.
  - b. Laboratory testing – testing regime to be provided by the *Contractor* for acceptance by the *Project Manager*. Laboratory testing shall include but not be limited to:
    - i. Determination of engineering parameters on the soils exposed in the trial holes
    - ii. Material classification at various depths and optimum moisture content determination
    - iii. Foundation Indicator and CBR Tests in terms of TMH1

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- c. The compilation of a comprehensive geotechnical report – review of the report – hold point for engineer. The Geotechnical Report must be prepared by a Geotechnical Engineer with adequate relevant experience. The geotechnical report should include but not limited to detailed soil logs, field test results, laboratory results and observations, and supporting calculations for conclusions drawn. The report should include all necessary items to help the Design Engineers in their work like foundation recommendations, bearing capacities of the ground, Suitability of the excavated earth material for backfill and Recommendations of sub-grade layers.
2. Medupi Specification for the preparation of engineered fills and backfill to all structures except backfill in turbine hall (200-6166) and SANS 1200 series should be adhered to in relation of earthworks, backfill and requirements for testing. All design and construction works shall be built in accordance to approved drawings and geotechnical recommendations supplied by the *Contractor*. A geotechnical PEC\declaration shall be produced by the *Contractor's* geotechnical engineer\specialist and shall include compilation, signoff, and submission of geotechnical databooks that shall be issued to the *Project Manager* for review once all works are completed.
3. All fills to be prepared in accordance with the Eskom backfill specification 200-6166 and relevant construction drawings. Where the drawings differ from the above specification, the specification shall take precedence.
4. The *Contractor* shall submit a construction method statement for preparation of engineered fill, inclusive of risk assessments per area of construction, to the *Project Manager* for review and acceptance within contractual period specified to *Contractor* prior commencement of back filling activities for review and acceptance by the *Project Manager*.
5. Quality control procedures as well as inspection and test plans (ITP's) shall be submitted by the *Contractor* for acceptance by the *Project Manager*. The *Contractor's* designer(s) shall clearly indicate all necessary invention points required. The *Project Manager* will indicate hold and witness points on the ITP. All specified tests and required interventions to be itemized on the ITPs and should be easily linked/referenced to all other technical documents. The *Contractor* shall include the following activities and interventions as a minimum on inspection and test plans:
  - a. All inspection and test plans shall be submitted by the *Contractor* to the *Project Manager* for acceptance. Hold and witness points shall be agreed between the *Contractor* and the *Project Manager*.
  - b. Acceptance of testing equipment including verification of manufacturing specifications and calibration certificates.

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- c. Rip (if applicable), adjust moisture content and compact subgrade to in situ density specified by relevant drawings and specifications.
- d. Import construction material from approved source.
- e. Compact layer thicknesses to specified in situ compaction densities.
- f. If instructed by *Project Manager*, the *Contractor* shall conduct plate load tests on final layer as per Eskom specification 200-6166.
- g. As-built survey of final layer.

### 6.2.2 Site clearance

1. The *Contractor* shall dispose any excess material from excavations to stockpile 7 and shall dispose any demolished waste concrete to stockpile 5. Table 2 below provides an estimated distance from the various stockpiles to the building location for information.

**Table 2: Estimated distance from Stockpiles to building areas.**

Building	Stockpile number 5 (km)	Stockpile number 7 (km)
Document storage, and Fire and Medical storeroom	2	4.5
Secondary clarifier substation	2	5.5

## 6.3 BUILDING WORKS AND ARCHITECTURAL FINISHES

1. A professionally registered Architect or professionally registered Senior Architectural Technologist will issue as-built drawings which he should confirm they comply with all parts of SANS 10400; the drawings should be submitted with a glazing certificate and fenestration calculations.

### 6.3.1 Standard architectural finishes – all buildings

1. Refer to document - Policy ESK PB AAQ 3 - Interior Specifications for Eskom for all paint and floor finishes colours.
2. Concrete apron to be a minimum of 1000mm wide and fall at least 20mm away from the building for quick and effective drainage.
3. All exterior walls to be satin face brick in stretcher bond, mortar is required to be Class II as per SANS 2001-CM1, plastered and painted inside with a beige colour.
6. Floor finishes to be as specified by designer, tiles to be beige or grey in colour, power float/grano to be grey in colour and vinyl to be grey or beige.

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7. Ceramic wall tiles to be laid on wall above kitchen countertop, height of splash back to be 600mm above countertop, colour of tiles to be grey.
8. Ceramic wall tiles to be laid from floor to ceiling in women and men's toilets, tiles colour to be grey.
9. All windows to be charcoal anodized aluminium window frames.
10. Ceiling to be crisp white in colour and have a 2-hour fire rating or be a non-combustible material.
11. Roofing to be a hip roof with min. slope of 3 degrees or a curved roof only, minimum radius of the curve to be 15m, all roof sheeting to be Klip-lok 700 profile 0.58mm thick high yield stress ASTM 446 grade E (3T), the sheets must be laid down, fastened, and sealed in accordance with the manufacturer's specifications.
12. Bullnose to be heavy industrial Z275 galvanised with eaves of 450mm radius with 750mm min. eaves to outer face of external wall, eaves to be closed with metal sheeting or rhino board.
13. All dry walls, if there are any, to have a firestop rhino board and have a 2-hour fire rating.
14. 'Clear view' fence is to have unobstructed clear view aesthetics, it must be an unclimbable fence with a minimum height of 1.8 meters, finish to be powder coat and PVC. The colour finish shall be black and the fence is to be installed according to manufacturer's instructions.
15. All carports to be dome shaped shade-port system with 4 steel columns, shade net cloth/net to be high density knitted polyethylene light weight and lock stitched with 90-95% UV sun block out, to be installed according to manufacturer's instructions. Steel colour - crisp white. Net colour - royal blue

### 6.3.2 Furniture – all buildings

1. The *Contractor* shall request for a visual inspection of typical furniture that's currently on site prior to procurement of furniture. The *Contractor* shall submit furniture prototypes to the *Project Manager* for acceptance before procurement of required furniture.
2. All new furniture is to comply to 240-52599753 Workplace space and furniture standard for commercial properties
3. Kitchen layout details are provided below:

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**Figure 4 : Kitchen (Image is for indicative purposes only)**

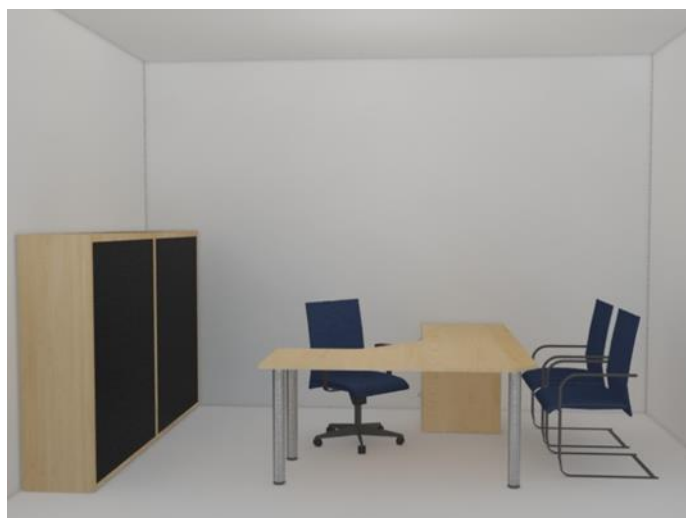
- a. Countertop – 600 wide and 32mm thick moss granite with 25mmØ bullnose with exposed edges 22mm thick re-engineered stone in shade of white, the designer is to consider counter space for appliances.
  - b. Cabinetry – kitchen cupboard carcass and doors made from 18mm thick melamine 32mm thick high-density particleboard, finish to be low glare continuous decorative laminate in a Vancouver Maple with matching edging.
  - c. Ironmongery – all doors to have 1 pair of spring loaded self-closing hinges and one 128mm steel hollow bar handle per door, handle to have a brushed finish.
  - d. Sink – 1200x500mm stainless steel double drop-in sink with polished finish, colour – silver.
  - e. Tap – chrome plated brass pillar type sink mixer tap that can swivel from side to side.
  - f. Table - 1200mmØ, 4-seater table with white laminate top with 4-way stainless steel base; legs to be fitted with an adjuster that can cope with uneven floor surfaces.
  - g. Chairs - Polypropylene moulded chairs (refer to Eskom Corporate Identity Manual for colours).
4. Kitchen appliances details are provided below:
- a. Water boiler – wall mounted 10 litres hydroboil, colour – white
  - b. Microwave oven – stainless steel satin, 34 litres electronic grill, 1150W, to be placed on top of the counter.
  - c. Fridge – 300 litres fridge with freezer, stainless steel satin finish, colour – grey
5. Office details are provided below:

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**Figure 5: Typical meeting table (Image is for indicative purposes only)**

- a. Meeting table – 10-seater rectangular table made of 32mm thick high-density particleboard with a minimum of 0.5mm low glare continuous decorative laminate in a Vancouver Maple finish, work surfaces to have a 3mm thick extruded PVC or ABS edging with all corners profiled and leaving no sharp edges. Edging to have a wood grain surface that matches the top, and to be of such a nature that it will not wear or wipe off. All edging to be applied using high-grade hot-melt adhesive, top to be supported on 75mm diameter steel tubing with a minimum wall thickness of 1.6mm.
- b. Chairs - Single shell, sleigh base armchairs in black; upholstered in Eskom Inspiration Fabric - Code Blue; to be constructed in round steel tubing with minimum of 25.4mm x 2.5mm wall thickness consistent throughout tubing.

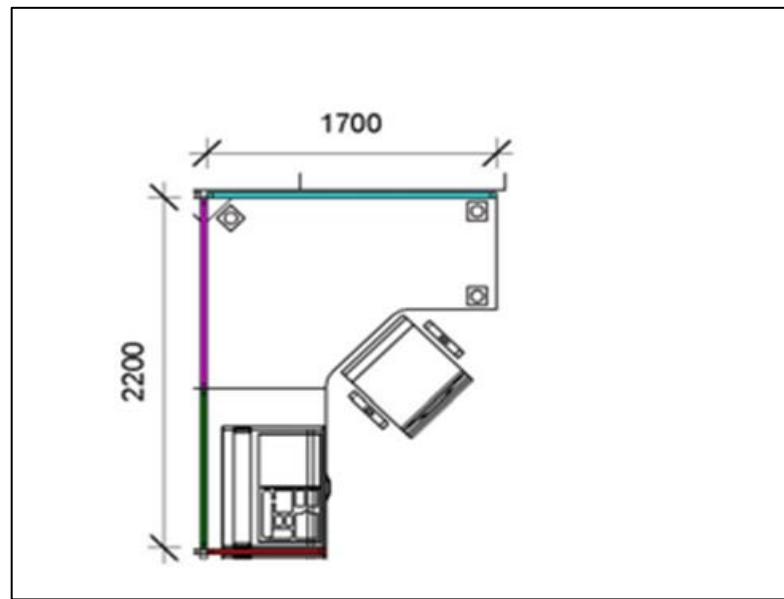


**Figure 6: Typical Eskom workstation (Image is for indicative purposes only)**

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**Figure 7: Typical Eskom D2 workstation (Image is for indicative purposes only)**

- c. Office chair - Synchronous office chairs on 5-star castor base; Upholstered in Eskom Inspiration Fabric - Code Blue.
- d. Office desk – Eskom D2 workstation, work surface to be made of 32mm thick high-density particleboard with a minimum of 0.5mm low glare continuous decorative laminate in a Vancouver Maple finish, top to rest on 75mm diameter steel tubing with a minimum wall thickness of 1.6mm and a pedestal with three drawers.
- e. Office cabinet - 16mm thick particleboard finished with a hard-wearing melamine surface, all components to have a 2mm thick extruded PVC edging, profiled and leaving no sharp corners. Colour to be a matching wood grain. All edges are applied using a high-grade hot-melt adhesive,
- f. Cabinet construction: is of a nature that will provide rigidity when moved and strong enough to carry loaded internal fittings, such as shelves or pull-out cradles. Centre shelf to be fixed to prevent “bowing” of side panels. Tops and bottoms of systems cabinets are 22mm thick CDL to provide loading strength. The base of the cabinet provides at least four ferrules that can be adjusted from the inside of the unit. Systems cabinets are capable of taking internal fittings easily in pre-determined positions. Shelves are made from epoxy powder coated mild steel. Colour to be black.
- g. Doors: roller-shutter doors are of extruded inter-locking slots in PVC or ABS and self-coloured in a Graphite colour. The handle is to be fitted with a Multi-Point locking mechanism, with two locking rods and two bar guides per bar. The lock, a "Multi Point lock 'called FURNLOCK" to have a removable barrel and master keyed to match all other locks.

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The handle on the roller shutter door is epoxy powder coated steel in a Graphite colour and inter-lock with the roller door section.

6. Waiting area furniture details are provided below:

- a. Coffee table 1 - 1200mm x 1200mm x 305mm with chromed steel base; colour lacquered glass in Eskom accent colour (refer to Eskom Corporate Identity Manual) or
- b. Coffee table 2 - 800mm x 800mm x 305mm with chromed steel base; colour lacquered glass in Eskom accent colour (refer to Eskom Corporate Identity Manual)
- c. Sofa – double sofa fully upholstered using contract grade fabric, cold moulded polyurethane foam; Accent Eskom colours can be used for upholstery (refer to Eskom Corporate Identity Manual)

7. Other furniture:

- a. Lockers – 6 door lockers to be epoxy coated and oven baked for superior finish, colour – grey. Total number of lockers for each building to accommodate the total number of employees per building.
- b. Benches - Single sided floor standing bench of 900mm length minimum, manufactured in angle iron, square tubing and meranti slats.

### 6.3.3 Passive Fire protection – all buildings

1. Roof ceiling to have a 2-hour fire rating or be a non-combustible material.
2. Emergency fire doors to have a fire rating of 2 hours in stability as well as 2 hours in insulation and integrity.
3. Drywalls to have a fire rating of 2 hours.
4. Finishes – paint finish in all rooms and ceramic tiles finish in all ablutions, all ceramic tiles to be fire resistant and the paint finish to be able to delays the expansion of fires.
5. Flooring – vinyl sheet flooring, concrete floated and ceramic tiles flooring in different rooms as indicated in the Architect's conceptual drawings, all these types shall be fire resistant.
6. All penetrations into the buildings and/or rooms in the building to be fire sealed with a 2-hour rated fire seal as per the requirements of the Eskom Fire Protection and Life Safety Design Standard.

### 6.3.4 Emergency route and signage – all buildings

1. The *Contractor* is to provide separate emergency escape and fire drawings for Eskom to review and approve. The fire emergency/escape route shall be designed in accordance with Medupi specifications and SANS 1040.

### 6.3.5 Painting and corrosion protection – all buildings

1. The painting and corrosion requirements are included in the following specifications.
  - a. The painting requirements are contained in the Specification for the Identification of the Contents of Pipelines and Vessels, 200-3583.
  - b. The corrosion requirements are contained in the Medupi Power Station Corrosion Protection Specification, SSZ\_45-17.

### 6.3.6 Document Storage Building functional requirements

1. The Document Storage Building shall be capable of storing the data book collection, consisting of a minimum of 50000 documents (collated hardcopy volumes in lever arch files or digital storage drives and Compact Discs), according to the requirements set out in 240-87412151 - Instruction for archiving hard copy records with the Eskom Archives.
2. The Medupi Project and Generation data book collection shall be stored in the necessary filing storage cabinet/Bulk filer units. The Document Storage Building shall support the document processing and administrative functions associated with managing the data book reviews and collection with dedicated rooms in the building.
3. This building shall include but not be limited to the following rooms: offices, ablution facilities, kitchen, waiting room, viewing room, storage cabinet hall/room, HVAC room (including fenced chiller yard), new roadway, and parking.
4. The *Contractor* shall supply, transport to site and install the required amount of filing storage cabinets / Bulk filer units in the storage cabinet hall/room, that caters for the 50 000 databooks,
5. The requirements for the Bulk filer units are captured in 240-52599753 - Workplace Space and Furniture Standard for Commercial Properties, page 79.
  - a. All sides of the panels shall have a fire resistance rating of 120 minutes.
  - b. The *Contractor* shall strategically position the filing storage cabinet/Bulk filer units in the storage cabinet/Bulk filer hall/room as per Eskom safety, fire and storage procedures.
  - c. The filing storage cabinet/Bulk filer units shall be anchored to the hall/room floor as per OEM recommendations. The *Contractor* shall submit a method statement for anchoring the /filing storage cabinet/Bulk filer units to the *Project Manager* for acceptance prior to commencing with arranging and fixing/anchoring to floor.
6. Table 3 indicates the various rooms and associated requirements that the *Contractor* to adhere to as a minimum for the Document storage building. Additionally, the Contractor shall refer to section 10.2.1 for detailed list furniture, fixtures, and equipment for this building.

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**Table 3: Document Storage Typical Rooms and Associated Requirements**

No	ROOM/AREA	REQUIREMENT DESCRIPTION
1	Storage cabinet/Bulk filler hall/room	<ul style="list-style-type: none"> <li>• Building to have a 4m clearance to ceiling, all internal walls to be fire walls.</li> <li>• Allow for controlled HVAC/ventilation conditions specific to storing of document/files, adequate lighting, and walking space around the storage filling cabinets/Bulk fillers units, they should not touch the wall, there must be 200mm min distance for air circulation between them &amp; walls.</li> <li>• Building and flooring design to cater for the prevention of water accumulating in this Bulk filler hall/room and prevention of water from entering into the Bulk filler hall/room from other rooms.</li> <li>• Storage filling cabinets/Bulk filler unit to be used must be adequately attached to the room/hall concrete floor. Typical storage filing cabinet/ Bulk filer unit size = 2350mm (length) x 1100mm (width) x 2350mm (height).</li> <li>• Refer to the following specification for additional details on filing cabinets required for this building 240-52599753 (Workplace Space and Furniture Standard for Commercial Properties). A particular number of 4-bay bulk filer is required to be arranged in rows within the room/hall to contain the 50 000 databooks.</li> <li>• A minimum of 50 000 files must be accommodated.</li> <li>• Hall/area of mminimum 800m<sup>2</sup> to accommodate current and future data book files requiring storage</li> <li>• Refer to section 10.2.1 for detailed list requirements.</li> </ul>
2	Waiting area	<ul style="list-style-type: none"> <li>• Air-conditioned open plan area for Visitors to wait to be attended by the Document Control Management staff at the front desk, the use of transparent sliding doors to keep this area separate to the other rooms shall be considered.</li> </ul>

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		<ul style="list-style-type: none"> <li>Refer to section 10.2.1 for detailed list requirements.</li> </ul>
3	HVAC room	<ul style="list-style-type: none"> <li>Plant room to be enclosed and house air handling units that will service the rest of the building and or specific rooms.</li> </ul>
4	Admin viewing area	<ul style="list-style-type: none"> <li>Also, within the office section of the building that is an Air-conditioned area with a 10-seater table, it must not be far from the printer room.</li> <li>Refer to section 10.2.1 for detailed list requirements.</li> </ul>
5	Kitchen	<ul style="list-style-type: none"> <li>Small kitchen with sink, Fridge, counter space for kitchen appliances and a 4-seater table.</li> <li>Building and flooring design to cater for the prevention of water accumulating and entering the Bulk filler hall/room.</li> <li>Refer to section 10.2.1 for detailed list requirements.</li> </ul>
6	Printing area	<ul style="list-style-type: none"> <li>To accommodate 1 x copier, 2 x plotters, 1 x printer and 1 x shredder.</li> <li>Refer to section 10.2.1 for detailed list requirements.</li> </ul>
7	Toilets/Ablution	<ul style="list-style-type: none"> <li>1 x Male &amp; 1 x Female toilets, 1x paraplegic toilet must be included as it is a requirement.</li> <li>Refer to section 10.2.1 for detailed list requirements.</li> <li>Building and flooring design to cater for the prevention of water accumulating and entering the Bulk filler hall/room</li> </ul>
8	Workstations/Open plan Office room	<ul style="list-style-type: none"> <li>Air-conditioned Office area accommodating 4 people, with standard Eskom "D2" desks as outlined in the 240-52599753. This office area must be kept away from the storage area and be integrated well with the other building rooms and have the necessary fire-resistant doors.</li> <li>Refer to section 10.2.1 for detailed list requirements.</li> </ul>
9	Storage Room	<ul style="list-style-type: none"> <li>The area should allow for open steel shelves (3 or 5 tier shelving) for stacking of the stationery supplies and an open dedicated/zone within this room for safely storing/mounting/placing items like step ladders, cleaning equipment and trolleys.</li> <li>Refer to section 10.2.1 for detailed list requirements.</li> </ul>

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10	Condenser units' yard	<ul style="list-style-type: none"> <li>Fenced condenser/chiller yard to be optimally located in relation to the building/structure and fenced with clear fencing. The fencing is to have a lockable security access gate of approximately 1600mm wide. Condensers units are to be mounted onto concrete plinth, which protrudes at least 50mm above finished floor level.</li> </ul>
11	Shaded/covered Parking	<ul style="list-style-type: none"> <li>4 x permanent staff parking and 2 visitors parking bays &amp; 1 paraplegic parking bay (all parking bays to be shaded/covered)</li> <li>The roadway to be integrated with the parking area for other buildings, fire and medical storeroom and substation in the area.</li> <li>Covered/Shaded required and shall match those existing on site</li> </ul>
12	Access road and terracing	<ul style="list-style-type: none"> <li>Roadway shall be integrated with existing buildings, storm water, services, and roadways</li> <li>Terracing around the building that will allow storm water runoff to drain away from building without ponding, this may include but not be limited to providing adequately design apron slabs around the building.</li> </ul>

### 6.3.7 Fire and Medical Storeroom functional requirement

1. The design of the storeroom shall incorporate the *Employer's* requirements. Refer to conceptual sketch as indicated in Figure 9.
2. The storeroom shall be designed to store fire and medical equipment. Below is a as provisional equipment list and is subject to finalisation with the *Project Manager*.
  - a. List of equipment:
    - i. 500 fire hoses
    - ii. 5000 liters of AFFF Foam 20 litre cans
    - iii. 3 fire skid units
    - iv. 100 box of first aid equipment
    - v. 10 disaster boxes
    - vi. 20 trauma boards
    - vii. 3 stretchers
    - viii. 10 Medical bags
    - ix. Medical line

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- x. 20 Fire nozzles
  - xi. 40 SCBA sets
  - xii. 80 SCBA cylinders
  - xiii. SCBA charging units
  - xiv. Extra PPE sets 309 boots, helmets, and bunker
  - xv. Two hose dolls
  - xvi. 150 fire extinguishers 9kg
  - xvii. 50 hose reels
  - xviii. 1 hearing booth
  - xix. 10 emergency beds with mattresses
  - xx. Emergency Radio handhold and vehicle sets
- 3. The storeroom must have a minimum floor plan area of 250m<sup>2</sup> and a minimum clear height of 5m.
  - 4. The building must be rectangular shaped with a roller door (2500x3600mm high minimum) as a single main entrance.
  - 5. The building shall not consist of windows
  - 6. An open racking system and free open area for placements of the equipment.
  - 7. The shelves required in the building are similar to the ones illustrated in Figure 8 below
  - 8. The storeroom is to have emergency exit(s) and emergency escape routes as per the requirements of SANS10400, active and passive fire protection, fire detection, fire system route, fire equipment and medical equipment storage considering the equipment sizes.
  - 9. The storage facility requires access for fire trucks with fire skid units.
  - 10. Forklifts will be used to pack fire skid units.
  - 11. The building shall have an HVAC system, active and passive fire protection, fire detection, electrical & Lighting supply,
  - 12. Ventilation requirements are to be natural or mechanical ventilated based on their classification in terms of SANS 10400 (National Building Regulations) and if mechanical ventilation is installed 10 air changes per hour criteria is to apply as minimum.
  - 13. There shall be cable tunnelling/trenches provided where required,
  - 14. Terracing around the building, access to the existing roads, an offloading area and a drive-in bay with concrete ramp leading into the building and its roller door shall be provided.

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Figure 8: Typical shelves required in the Fire and Medical storeroom

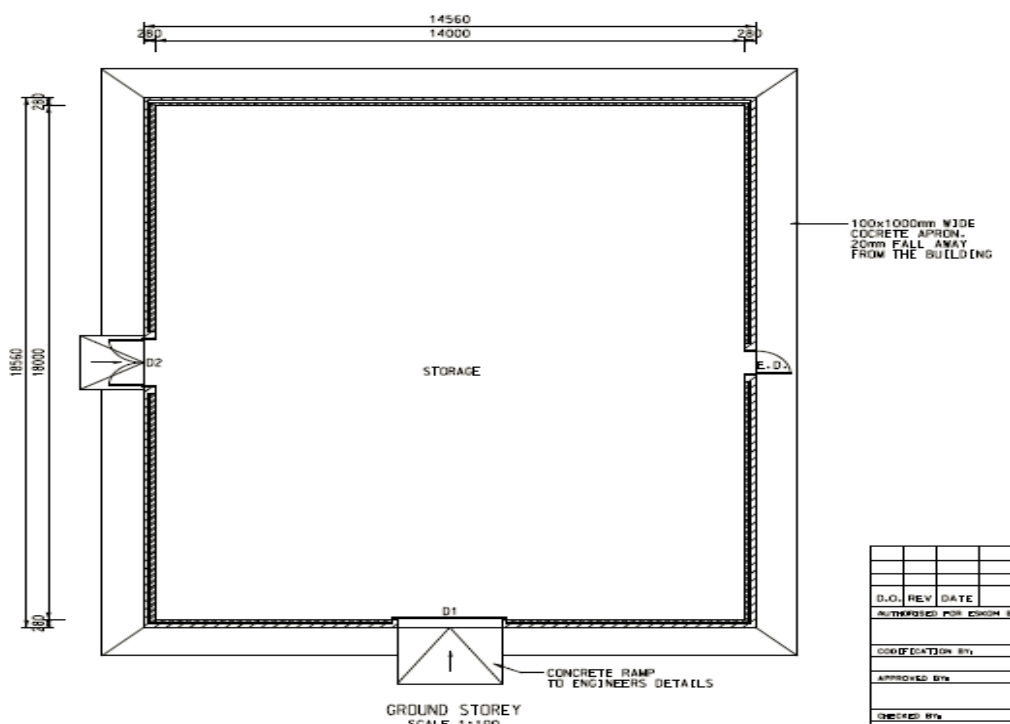


Figure 9: Fire and Medical Storage Conceptual Layout

### 6.3.8 Secondary Clarifier Substation functional requirements

1. The Secondary Clarifier Substation will be situated at the Secondary Clarifier Treatment Plant at the Clean and Dirty dams. The substation houses C&I and Electrical equipment responsible for the control and powering of the:

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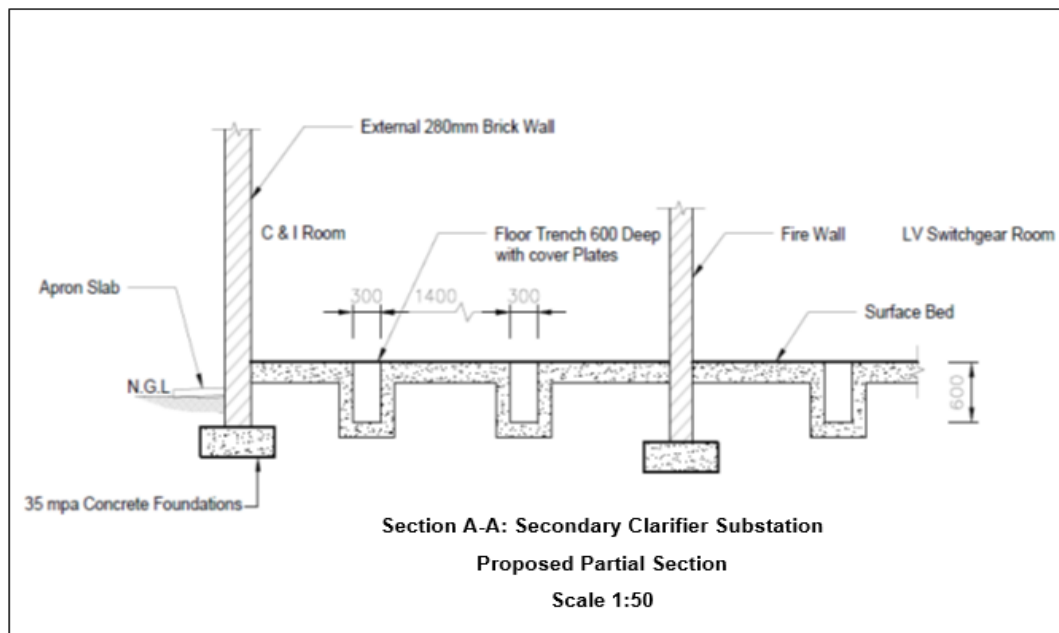
- a. Secondary Clarifier Treatment Plant
  - b. Clean and Dirty water dams' collection chamber (controlling water below the liner)
  - c. Clean and Dirty water dams de-oiling plant
  - d. Clean and Dirty dams pump station.
2. The layouts of the equipment to be housed in the secondary clarifier can be found on the drawings listed in Table 7.
3. The distance between the equipment and the equipment and the wall should be a minimum of 1 meter.
4. Figure 10 and Figure 11 shows a conceptual layout of the secondary clarifier substation floorplan.
5. The substation shall have a minimum floor area of 140m<sup>2</sup>.
6. The substation shall have an HVAC system, active and passive fire protection, fire detection, electrical (small power, lighting and earthing) supply.
7. The substation is to have emergency exit(s) and emergency escape routes as per the requirements of SANS10400, active and passive fire protection, fire detection, fire system route, fire equipment.
8. The doors of the substation shall be designed to grant adequate access to fit the equipment that will be housed in it.
9. The substation is to have an effective offloading area at each room to safely offload the equipment and move it into the room to final position.
10. There shall be trenches provided where required.
11. The secondary clarifier plant is currently supplied with electricity from a temporary container which is located on the opposite side of the road of the Secondary Clarifier plant and nearby the permanent mini substation that provides power to the plant. Currently all power and control cables are installed, and safety cleared from the equipment in the temporary structure.
12. The proposed location for the clarifier is located on the same side of the road as the plant. Since the plant is already safety cleared from the temporary containerized substation, it cannot be taken out of service for a long duration. The construction schedule of the new substation will be a relative long duration against what the down time of the plant can handle to production.
13. The following works will be required to be implemented due to the new location for the substation. The works are not limited to the below listed. Refer to section 6.8 for more detail:
  - a. The *Contractor* shall design and construct a new cable trench from the new substation at the proposed location and integrate it into the current cable trench for the plant.

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- 
- EXTERNAL BRICK WALL REFER TO ARCHITECTURAL SPECIFICATION.
- HVAC ROOM
- LV SWITCH GEAR ROOM
- 300 x 600 DEEP TRENCH
- FIRE WALL
- 300 x 600 DEEP TRENCH
- 300 x 600 DEEP TRENCH
- C & I ROOM
- 800mm Wide Trench (800 Deep)
- 600
- 600
- REMOVABLE TRENCH COVER PLATES/ SLABS
- 280 4500 250 8500 280
- 91500 240
- TBC: ALL DIMENSIONS TO BE CONFIRMED BY CONTRACTOR
- Secondary Clarifier Substation**
- Proposed Floor Plan**
- Scale 1:50**

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**Figure 11: Concept drawing of Secondary Clarifier Substation**

## 6.4 CIVIL ENGINEERING AND STRUCTURAL WORKS

1. The Civil and Structural Works outlined comprises of all geotechnical works, structural steel, concrete works, brickwork, timber, earthworks, roadworks clean and dirty effluent drainage, sewage and storm water drainage, this is inclusive of all supporting infrastructure for the Mechanical, C&I and Electrical scope indicated in the preceding sections of this document.
2. The *Contractor* shall also submit construction method statements for acceptance by the *Project Manager* for all works, inclusive of risk assessments per area of construction. These documents shall be submitted to the *Project Manager* for review and acceptance within the agreed contractual period/time frame prior commencement of respective activities.
3. Quality control procedures as well as inspection and test plans (ITP's) shall be submitted by the *Contractor* for acceptance. The *Contractor's* designer(s) shall clearly indicate all necessary invention points required. The *Project Manager* will indicate hold and witness points on the ITP. All specified tests and required interventions to be itemized on the ITPs and should be easily linked/referenced to all other technical documents.

### 6.4.1 Structural Building works

#### 6.4.1.1 General specification – all structures

1. The *Contractor's* designer shall consider the type of terrain surrounding the buildings described in this scope of work when performing wind load calculations.

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2. The *Contractor's* design and construction shall take into consideration all local site and geotechnical conditions.
3. The *Contractor's* designer shall analyse and design all structures and structural elements considering all appropriate load cases and load combinations as defined in SANS 10160 (all parts of latest edition).
4. If the *Employer* has not provided the *Contractor's* designer with all the necessary information\requirements to perform the analysis and design of any structure, the *Contractor* shall request this information timeously from the *Project Manager*.

#### **6.4.1.2 Structural design integration with other works – all structures**

1. As specified (refer to HVAC, ELEC, C&I, FIRE sections of this document) the *Contractor* is responsible for the integrating of the design, construction, and certification of all systems within the buildings.

#### **6.4.1.3 Structural Concrete – all structures**

1. All concrete works shall be designed and constructed in accordance with the Medupi Concrete specification for structural concrete (84CIVL053) and applicable design specifications.
2. Minimum strength for structural concrete on Medupi power station is 35 MPa as indicated in the Medupi Concrete specification for structural concrete (84CIVL053).
3. Due to the aggressive environment that the reinforced concrete works are exposed to, the exposure condition of the concrete is classified as severe in accordance with SANS 10100-2, hence the quality of concrete works is of paramount importance. To ensure durability of these works, all reinforced concrete works shall be designed to limit the concrete crack widths to a maximum of 0,004 time the nominal concrete cover specified. The *Contractor* shall ensure that concrete design, detailing and, construction work is done in such a manner to ensure plastic-shrinkage cracks and drying-shrinkage cracks are limited to the specified crack widths
4. The *Contractor* shall submit, prior to the casting of any concrete, to the *Project Manager* the following for review and acceptance:
  - a. Concrete mix designs, concrete-mix trial test cube results and all other required test results as indicated in the Medupi Power Station Specification for Structural Concrete (84CIVL053).
  - b. Detailed construction method statements.

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#### 6.4.1.3.1 Adverse weather conditions – all structures

1. The *Contractor* should note temperatures typically experienced in the region of Medupi Power Station. The *Contractor* shall consider adverse weather conditions in the design and construction of all works.
2. For clarity of the Medupi Power Station specification for structural concrete, the *Contractor* to note the following: When ambient temperature is above 36 °C, the temperature of the concrete when deposited shall not be allowed to exceed 32 °C and when ambient temperature is below 36 °C, the temperature of the concrete when deposited shall not be allowed to exceed 35 °C.

#### 6.4.1.3.2 Concrete materials and concrete testing – all structures

1. The *Contractor* to fully comply with the testing stipulated in document number 84CIVL053. Where any concrete and concrete material testing frequency is unclear, the *Contractor* and *Project Manager* to discuss and agree on a frequency. All test results to be submitted to the *Project Manager* for review and acceptance.
2. Due to the importance of the concrete works the *Contractor* may be required to perform durability index tests on concrete works identified as potential defects which may have an impact on the durability of the concrete works.
3. Durability index tests may also be used to assess the durability of existing works in the absence of the specified quality assurance and quality control tests during construction. These tests are developed to assess the transport properties of the concrete cover zone. Three durability tests are defined as:
  - a. Oxygen Permeability Index test - SANS 3001-CO3-2:2015,
  - b. Chloride Conductivity test - SANS 3001-CO3-3:2015, and
  - c. Water Sorptivity test –Latest available SANS or equivalent/applicable international standard
4. Table 4 below provides classification for different test results for the three tests. The acceptance criteria for test results for the three different tests shall be classified as “Good” or “Excellent”. The *Contractor* to ensure the works are scheduled taking into consideration time for defects resolutions.

**Table 4: Durability test results classification**

	Oxygen Permeability	Sorptivity	Chloride Conductivity
Excellent	> 10	< 6.0	< 0.75
Good	9.5 - 10	6 - 10	0.75 - 1.5
Poor	9.0 - 9.5	10 - 15	1.5 - 2.5
Very Poor	< 9.0	> 15	> 2.5

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5. The *Contractor* shall submit subject matter expert reports at the cost of the *Contractor* for material and concrete testing, as specified or agreed between the *Project Manager* and *Contractor*, if such data is missing from the data books. Such report shall provide assurance of testing/calculations to indicate the acceptability of the materials used and to assure that long-term technical assurance of the works and design intent. Where needed, in addition to the above indicated durability index tests, the *Contractor's* designer/subject specialist must consider the following aspects as part of long-term durability assurance:
- a. In the absence of the specified concrete drying shrinkage tests, or concrete cracking identified that exceeds the crack width limits, the *Contractor's* designer/subject specialist shall investigate, test, analyse and make where necessary recommendations supported by a detailed report and risk assessment which shall be submitted to the *Project Manager* for review and acceptance.
  - b. In the absence of concrete tests results for chlorides and sulphates further testing and reporting is required by the *Contractor's* designer/subject specialist. The concrete works could be tested for chlorides in accordance with BS 1881 Part 124 1988 test procedure and sulphates in the concrete works could be tested in accordance with SABS method 850-1:1998.
  - c. In the absence of Alkali-Silica reaction tests as specified by the Eskom concrete specification the *Contractor* shall appoint a subject specialist to inspect, review available test data and submit a report with a risk assessment and recommendation for acceptance by the *Project Manager*.

#### **6.4.1.4 Structural Steel – all structures**

1. The *Contractor* shall ensure that all conceptual, detailed, and final construction drawings are accepted as per Eskom's design review processes prior to beginning construction and that compliance is maintained to all specifications for material grades that are fabricated and erected. This includes fabrication and erection tolerances, testing parameters and corrosion protection required for steel structures and their supporting elements.
2. The *Contractor* is also required to submit to the *Project Manager*, steel grade certificates, fabrication drawings, welder's certificates and quality and test plans for review prior to fabrication.
3. All structural steel work must be designed, manufactured, and erected in accordance with all relevant SANS and Eskom specifications. The *Contractor* shall take note of the following requirements:

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- a. All structural steel members, except purlins and girts as well as other secondary members like connection cleats and plates and ant-sag bars, shall be from Steel EN 10025-2-S355JR (Grade S355JR).
- b. Purlins and girts may be from cold-formed lipped angle, channel, or Z-sections. Due to inaccessibility for initial and subsequent brush or spray-painting purlins and girts shall be made from pre-galvanized sheet or hot dip galvanized after fabrication.
- c. Equal angles up to 50x50 mm that are commonly made of commercial quality steel shall not be used as primary (main) structural members. Sections made from commercial steel quality can be used, if in accordance with the designer's specification, as secondary elements like ant-sag bars and as connection cleats.
- d. Plates forming part of primary structural members and primary member connections shall be of Grade S355JR steel.
- e. All structural steel elements, metal grating, stair treads and fasteners that are required to be hot dipped galvanized shall conform to SANS 121. Also refer to Eskom's corrosion specification which shall be adhered to by the *Contractor*.
- f. Hand railing, floors, platforms, and walkways are required to be provided with kick plates 100mm x 6mm.
- g. Only coded welders are to perform all welding works. Supporting welding documentation must be submitted to the *Project Manager* for review and acceptance prior to construction. Note: All welding is required to comply with AWS D1.1.
- h. All welding joints are required to be inspected using visual aids and/or non-destructive tests as indicated below:
  - i. Butt welds 100% ultrasonic NDT
  - ii. Fillet welds 20% MPI.
  - iii. Or as directed by the *Contractor* and agreed with the *Project Manager*

#### **6.4.1.5 Brickwork – all structures**

- 1. Mortar is required to be Class II as per SANS 2001-CM1
- 2. All brick force to comply with SANS 2001 CM1
- 3. All external walls to be satin facebrick outside and plastered & painted internally, 230mm minimum wall thickness.
- 4. Internal brick walls to be plastered and painted both sides, 125mm minimum wall thickness.
- 5. Internal dry walling to be at least 2 hours fire rated walls plastered & painted both sides

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#### 6.4.1.6 Document Storage Building

1. Integration with existing structures and services, cable, and pipe trenches. The following includes the services requiring integrating with the existing site infrastructure:
  - a. Potable water
  - b. Fire water
  - c. Sewer
  - d. Stormwater
  - e. Electrical
  - f. Tele-communication
2. The building superstructure:
  - a. A single-story building consisting of curved structural steel roof trusses/beams, concrete columns, and reinforced concrete surface bed.
  - b. Masonry brick walls as per architectural specifications.
  - c. Surface bed, surface finishing and floor joints shall be designed to withstand all applicable load cases and load combinations.
  - d. HVAC chiller yard (if required)
3. The building substructure:
  - a. A foundation system that shall be investigated and designed by the geotechnical engineer and the *Contractor's* design engineer.

#### 6.4.1.7 Fire and Medical Store

1. Integration with existing structures and services, cable, and pipe trenches:
  - a. The *Contractor* is to ensure scanning of the area prior to any excavations are performed to determine any existing service under the footprint of the works. These services include, but not limited to electrical services, fire water, sewer, and storm water services.
2. Building superstructure:
  - a. The building shall be a single-story building consisting of structural curved steel roof trusses/beams, concrete columns, and reinforced concrete surface bed.
  - b. The building walls are to be masonry brick as per architectural specifications
  - c. The surface bed, surface finishing and floor joints shall be designed to withstand all applicable load cases and load combinations.
3. Building substructure:

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- a. The foundation system shall be investigated and designed by the geotechnical engineer and the *Contractor's* design engineer.

#### **6.4.1.8 Secondary Clarifier Substation**

1. Integration with existing structures and services, cable, and pipe trenches and covers
  - a. The *Contractor* is to ensure scanning of the area prior to any excavations are performed to determine an existing service under the footprint of the works.
  - b. The *Contractor* shall position the building to ensure existing services and structures are not disrupted during the construction of works.
2. Building superstructure.
  - a. The building layout and details shall be suitable to fulfil its requirements as an electrical substation. The building super structure may consist of structural steel, or timber roof trusses/beams supported by concrete columns, concrete ring beams, or load bearing masonry walls as per architectural specifications.
3. Building substructure.
  - a. The foundation system shall be investigated and designed by the geotechnical engineer and the *Contractor's* design engineer.
  - b. The surface bed, or if required the suspended floor slab, shall be designed to withstand all applicable load cases and load combinations.
  - c. Provision in the slab shall be made for cable trenches to accommodate the electrical works.

#### **6.4.2 Civil works**

##### **6.4.2.1 Stormwater drainage and terrace Design and Construction – all structures**

1. The *Contractor* shall design and construct the stormwater drainage and terrace required to facilitate efficient drainage around the building. The design shall be based on a 1 in 50-year storm event with a minimum nominal pipe diameter (ND) of 450mm. All stormwater pipes shall be pre-cast concrete pipes with a pipe class of 100D with Spigot & Socket Joint and rubber rings.
2. The *Contractor* shall ensure that his design integrates with all other services and/or buildings in the immediate vicinity. The *Contractor's* design shall consider the existing stormwater system in the area and tie-in to the closest clean water manhole available in the area, refer to drawing series 0.84/198 & 0.84/199.
3. The *Contractor* shall ensure only to work with actual survey information to confirm levels, tie-in positions, etc.

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4. The Works shall include all relevant material required (bedding sand, pipes, selected layers etc.) and construction according to the approved design as well as adhering to all relevant specifications and SANS codes including but not limited to SANS 1200.
5. In terms of documentation the *Contractor* shall submit method statements and relevant ITPs for acceptance before commencement of any construction works.
6. The *Contractor* shall obtain an excavation permit before commencement of any type of excavation required for construction.
7. Surveys will be submitted for acceptance pre, post and during construction (as per the approved ITP) by the *Contractor* to ensure compliance to all specifications and that design intent was achieved.
8. The *Contractor* shall include the following activities and interventions as a minimum on inspection and test plans (ITP):
  - a. Approval of testing equipment including verification of manufacturing specifications and calibration certificates.
  - b. Approval of construction materials. *Contractor* to submit following test results at appropriate intervals to the *Project Manager* for review and acceptance – grading analysis, Atterberg Limits, Mod AASHTO and CBR.
  - c. Rip (if applicable), adjust moisture content and compact subgrade to in situ density specified by relevant drawings and specifications.
  - d. Verify subgrade compaction density and stiffness through specified testing.
  - e. Import construction material from approved source.
  - f. Compact in approved layer thicknesses to specified in situ compaction densities.
  - g. Verify layer compaction density and stiffness through specified testing.
  - h. As-built survey of final layer.

#### **6.4.2.2 Roadworks and Earthworks Design and Construction – all structures**

1. The *Contractor* shall design and construct all road and earthworks in accordance with SANS 1200 standards. The *Works* shall include material filling, layer works, concrete block paving, guardrails road markings as per SANS standards. All *Works* are required to comply with approved design drawings and the Medupi Specification for the preparation of engineered fills and backfill to all structures except backfill in turbine hall (document number 200-6166)
2. Medupi typical road section details to be used as per drawing 0.84/202, this is to ensure uniform road layers throughout site to allow for standardised maintenance.
3. The *Contractor* shall ensure only to work with actual survey information to confirm levels, tie-in positions, etc.

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4. The *Contractor* shall supply all relevant material required (bedding sand, pipes, selected layers etc) according to design specifications and relevant SANS codes. The *Contractor* will submit method statements and relevant ITPs for acceptance before commencement of any construction works. The *Contractor* will obtain an excavation permit before commencement of any type of excavation required for construction. Surveys will be submitted for acceptance during construction (as per the approved ITP) by the *Contractor* to ensure compliance to the *Contractor's* design and specification. The *Contractor* shall include the following activities and interventions as a minimum (where applicable) on inspection and test plans:
  - a. Approval of testing equipment including verification of manufacturing specifications and calibration certificates
  - b. Approval of construction materials. *Contractor* to submit following test results at appropriate intervals to *Project Manager* for review and acceptance – grading analysis, Atterberg Limits, Mod AASHTO and CBR
  - c. Rip (if applicable), adjust moisture content and compact subgrade to in situ density specified by relevant drawings and specifications
  - d. Verify subgrade compaction density and stiffness through specified testing
  - e. Import construction material from approved source
  - f. Compact in approved layer thicknesses to specified in situ compaction densities
  - g. Verify layer compaction density and stiffness through specified testing
  - h. As-built survey of final layer

#### **6.4.2.3 Layer works and Concrete Block Paving – all structures**

1. Precast concrete kerbs, edgings and channels are required to comply to SANS 927.
2. Road lime chemical stabilizing agents is required to comply with SANS 824
3. Chemical stabilizing cement is required to comply with SANS 50197-1
4. Concrete paving blocks shall comply with the requirements of SANS 1058.

#### **6.4.2.4 Road Markings and signage– all structures**

1. Road marking paint shall comply with the requirements of SANS 731-1.
2. The no-pick-up time of road marking paint shall comply with Class 1 requirement in SANS731 1.

#### **6.4.2.5 Document Storage Building**

1. Terracing around the building that will allow storm water runoff to drain away from building without ponding. *Contractor* to refer to drawing 0.84/193.

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2. Access to the existing roads with adequate parking and drainage will be designed and constructed by the *Contractor*. Medupi typical paved road cross sectional details to be used as per drawing 0.84/202, this is to ensure uniform road layers throughout site to allow for standardised maintenance.
3. For the design details of the existing roads in the area the *Contractor* should refer to drawings 0.84/200 sheets 11 and 0.84/7245 sheets 2, 4, 5 7, 8 and 9. The *Contractor* to ensure only to work with actual survey information to confirm levels, tie-in positions, etc.
4. 4 parking bays (2 being paraplegic bays) and a loading bay with adequately designed concrete ramps for offloading equipment and files shall be provided to service the Document Storage Building
5. For the design details of the existing clean storm water layout of the area the *Contractor* should refer to drawing 0.84/7242 sheet 16 for the layout and drawings 0.84/7243 sheet 7, 8, 10, 11 and 12 for the long sections.
6. This building has a sewer requirement, the *Contractor* is therefore referred to the main sewer reticulation layout on drawings 0.84/242 sheet 1-3 and its relevant long sections on drawings 0.84/243 sheet 1-10. The *Contractor* should also refer to the admin island sewer reticulation drawings 0.84/7244 sheet 1-8. The *Contractor* to ensure only to work with actual survey information to confirm levels, tie-in positions, etc.
7. The *Contractor* can refer to Table 8, Document BS 001, for services routing, connection points and relative distances. Only the Medupi typical road section details drawing (0.84/202) will be issued with the scope for all tenderers. All other related drawings in the Civil Works section will only be issued after tender award.

#### **6.4.2.6 Fire and Medical Storeroom**

1. Terracing around the building that will allow storm water runoff to drain away from building without ponding. *Contractor* to refer to drawing 0.84/193.
2. Access to the existing roads with adequate parking and drainage will be designed and constructed by the *Contractor*. Medupi typical paved road cross sectional details to be used as per drawing 0.84/202, this is to ensure uniform road layers throughout site to allow for standardised maintenance.
3. For the design details of the existing roads in the area the *Contractor* should refer to drawings 0.84/200 sheet 11 and 0.84/7245 sheets 2, 4, 5 7, 8 and 9.

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4. 4 parking bays (2 being paraplegic bays) shall be provided to service the Fire and Medical Storeroom. Access into building shall be provided for offloading of equipment.
5. For the design details of the existing clean storm water layout of the area the *Contractor* should refer to drawing 0.84/7242 sheet 16 for the layout and drawings 0.84/7243 sheet 7, 8, 10, 11 and 12 for the long sections.
6. There is no requirement for sewerage to this building.
7. The *Contractor* can refer to Table 8, Document BS 001, for services routing, connection points and relative distances. Only the Medupi typical road section details drawing (0.84/202) will be issued with the scope for all tenderers. All other related drawings in the Civil Works section will only be issued after tender award.

#### 6.4.2.7 Secondary Clarifier Substation

1. Terracing around the building that will allow storm water runoff to drain away from building without ponding. *Contractor* to refer to drawing 0.84/194.
2. Access to the existing roads with adequate parking for offloading of equipment and drainage will be designed and constructed by the *Contractor*. Medupi typical gravel road cross sectional details to be used as per drawing 0.84/202, this is to ensure uniform road layers throughout site to allow for standardised maintenance.
3. For the design details of the existing roads in the area the *Contractor* should refer to drawings 0.84/200 sheet 30, 31, 32 and 33.
4. For the design details of the existing storm water layout of the area the *Contractor* should refer to drawing 0.84/16468.
5. There is no requirement for sewerage to this building.
6. The *Contractor* can refer to Table 8, Document BS 004, for services routing, connection points and relative distances. Only the Medupi typical road section details drawing (0.84/202) will be issued with the scope for all tenderers. All other related drawings in the Civil Works section will only be issued after tender award.

### 6.5 MECHANICAL WORKS

#### 6.5.1 General

1. The *Contractor* is required to submit a complete design for all mechanical works. This includes but is not limited to design reports, hydraulic calculations, P&ID and general arrangement drawings.

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2. The designs shall be reviewed as detailed in section 5.3.1 of this document and any changes shall follow the design change process as defined in section 5.3.1 of this document.
3. All fire protection, fire detection and HVAC designs shall be integrated by the *Contractor*.

#### **6.5.2 Piping**

1. All piping shall comply with the Eskom Standard for Low Pressure Pipelines.
2. Fire water piping and equipment to comply with the requirements of the relevant fire design standard as well as Eskom Fire Protection and Life Safety Design Standard.

#### **6.5.3 Valves**

1. All valves shall comply with the Eskom Standard for Low Pressure Valves.
2. All valves used for fire protection installations to be FM/UL approved.
3. The use of high-volume fire hydrants is not preferred. Should the fire protection design require the use of such hydrants permission should be requested by the *Contractor* from the Medupi Fire Chief prior to design finalization.

#### **6.5.4 Commissioning requirements**

1. All commissioning to be done as per the On-site Commissioning of Low-Pressure Systems Standard.
2. Fire protection systems commissioning to be as per the acceptance criteria of the relevant design standard.

#### **6.5.5 HVAC**

1. The HVAC works for the associated buildings shall comply with 240-70164623 Eskom HVAC Design Guideline and 240-102547991 General Technical Specification for HVAC Systems Standard.

##### **6.5.5.1 Document Storage Building**

1. The document storage building will require its own dedicated HVAC system to provide cooling, pressurization, and ventilation for the following areas within the document storage building:
  - a. Storage filing cabinet/Bulk filer hall/room
  - b. Waiting Area
  - c. HVAC Plant Room

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- d. Admin Viewing Area
  - e. Kitchen
  - f. Toilets/Ablution area
  - g. Office areas
  - h. Storage Rooms
2. Two air ducted Systems will be installed and supplied by Air Handling Units (AHU's) located within the plant room and the condenser units positioned outside on the equipment yard. The HVAC system shall closely control indoor temperature and humidity as per Instruction for Archiving Hard Copy Records in the Eskom Archives - Doc No. 240-87412151

#### **6.5.5.2 Fire and Medical Store**

1. Ventilation requirements are to be natural or mechanical ventilated based on their classification in terms of SANS 10400 (National Building Regulations). HVAC systems should be interfaced with the Fire detection Fire Protection requirements will be determined in the Fire Protection Detection Assessment. Fire detection requirements to be in accordance with 240-56737448 Fire Detection and Life Safety Design Standard.

#### **6.5.5.3 SECONDARY CLARIFIER SUBSTATION**

1. Cooling, filtration, and pressurization will be required. Two ducted DX units will be required with 100% redundancy.

#### **6.5.6 POTABLE WATER**

##### **6.5.6.1 Document Storage Building**

1. Potable water will be required for the kitchen, toilets and ablution facilities in the document storage building which will tie into the existing Medupi services.
2. The connection point: Valve Pit C1 to be demolished, rebuilt and connected to the adjacent main line. The tie-in to the existing potable water ring main shall be at coordinates Y=-57479.990, X=26622226.000 (refer to Drawing Nos. 0.84/2839/07 & 0.84/56262 sheet 4).

#### **6.5.7 Fire Protection**

The following general requirements shall be applied to the fire protection designs of all buildings included in this section:

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1. The design, installation and commissioning of the fire protection shall be in accordance with *Employer's Fire Protection and Life Safety Design Standard*
2. Portable fire extinguishers covering all fire risk areas, positioned at strategic fire points. Potable fire extinguishers to be as per SANS 1910.
3. Passive fire protection measures such as separation of flammables/ combustibles from ignition sources, enclosure and/or compartment of fire risks, fire-sealing of service penetrations, and coating of cables in potentially fire exposed areas shall be included in the *Contractor's* design and construction.
4. The *Contractor* shall provide fire hose reels and hydrants which and shall install all piping & fittings as required, and perform, pressure testing, flushing, and commissioning of the fire water piping. Fire hydrants standpipes shall be protected by a concrete pedestal painted golden yellow as per SANS 10140-2. The concrete pedestal shall be designed to protect the hydrant standpipe from damage.
5. Provision of an emergency lighting system, emergency escape routes and exits.
6. Safety Signage (fire equipment and evacuation route) which comply with SANS standards.
7. Adequate escape routes shall be provided from all areas in the building as per the requirements of SANS 10400.
8. A fire plan drawing shall be provided in accordance with National Building Regulations and Building Standards Act No. 103 of 1977.
9. The *Contractor* to submit the 3D piping model for acceptance prior to starting with construction.
10. All fire piping and equipment to be PN16 rated. Corrosion protection to be as per the requirements of section 6.3.5 of this document. All fire piping to be fully painted signal red.
11. All below ground piping and fitting shall PVC-M as per SANS 966-2 and installed as per the manufacturer's recommendations.
12. A fire rational or deem to satisfy design to be provided by the *Contractor*.

#### **6.5.7.1 Document Storage Building**

The *Contractor* shall design, supply, install and commission the fire protection for the complete works. The *Contractor* includes as a minimum the following:

1. Fire water is supplied from the site fire ring main at the ring main valve pit C1. The *Contractor* is required to demolish and reconstruct the current valve pit C1. Valve pit C1 is currently not

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connected to the site ring mains, however provision has been made for fire and potable water supply to the valve pit by means of a T-piece. The *Contractor* is required to connect valve pit C1 to the current site ring mains.

- a. Refer to the building services document in Table 8, Document BS 001. The position of the current valve pit A1 is as shown. The new valve pit C1 should be in the same position.
  - b. The tie-in to the existing fire water ring main shall be at coordinates Y=-57487.995, X=26622222.294 Z= 899.104.
2. The fire water piping from valve pit C1 is required to provide fire water to the Document Storage Building as well as the Fire and Medical Store.

#### 6.5.7.2 Fire and Medical Store

The *Contractor* shall design, supply, install and commission the fire protection for the Fire and Medical Store. The fire water supply shall be from valve pit C1 as detailed in section 6.5.7.1 above. The fire protection design shall include the following as a minimum:

1. A Fire Risk Evaluation and its implementation in the design of the system.
2. The fire design to be submitted for review prior to installation and should include as a minimum the fire rational or deem to satisfy design, spray pattern drawings, hydraulic calculations, General arrangement drawings and P&ID's.
3. The sprinkler system shall be as per the requirements of NFPA 13.
4. The *Contractor* shall evaluate the requirement for in-rack sprinklers as per NFPA 13 based on the final racking and storage design.
5. The *Contractor* shall ensure that the separation distances to nearby structures and/or buildings are adequate to prevent the spread of fire.
6. The separation distance from the building to any vehicles or combustibles shall be a minimum of 7.6 meters.

#### 6.5.7.3 Secondary Clarifier Substation

The substation fire protection design is required to be similar to that of all other substations at Medupi Power Station. The following to be adhered to:

1. Potable fire extinguishers shall be provided. The majority of the fire extinguishers to be installed outside the building, however extinguishers are also required inside the substation rooms.
2. Fire hose reels shall be provided as per the SANS 10400 requirements.

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3. A fire hydrant to be provided within 40 meters of the building.
4. The separation distance from the building to any vehicles or combustibles shall be a minimum of 7.6 meters.
5. Cable penetrations through walls and into the different building areas shall be adequately fire sealed using approved materials, with a 2hr fire retardant rating related to stability, insulation, and integrity. The design shall be reviewed for the fire stops and seals, including the materials, their characteristics regarding flammability and fire retardancy, and their fire underwriters rating. All cable and cable tray penetrations through walls and floors as well as any other types of cableways or conduits shall have fire stops installed.
6. Refer to Table 8, Document BS 004, for the building services document of the secondary clarifier substation. The fire water supply shall be connected to the existing fire water line in the area. The location indicated in the building services drawing is an estimation of the position of the line. The *Contractor* shall be required to locate and tie-in to the line at the approximate location as shown.

## 6.6 ACCESS CONTROL

### 6.6.1 Requirements for each structure – all buildings

1. The scope includes the design, supply, installation and commissioning of the following:
  - a. Biometric access control
  - b. CCTV
  - c. Fire detection system and
  - d. Monitoring of HVAC system
2. The *Contractor* is required to cooperate with all stakeholders to integrate requirements and provide a fully functional system.

### 6.6.2 Alarm management and alarm response

1. The alarms from the BMS shall always be displayed at a permanently manned location (access control room), with some selected alarms repeated at other control rooms or emergency response centres if necessary. The access control room shall be provided by the *Employer*.
2. The BMS alarming should conform to the power station's alarming philosophy as per the Alarm Management System Guideline (240-56355466).

### 6.6.3 Access Control and Security

1. Access to all entry point into and within the building shall be protected by an electronic access control system with different access level, which allows only authorised individuals to the facility.

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2. The building shall have integrated video camera system (which log video streams when access happens) installed on the entrance door as well as inside the room. This system must be accessible remotely (by linking it to the BMS, and by extension the CBMS) to monitor activities and be a visual aid in case of a disaster.
3. An anti-pass back system shall be included to prevent a cardholder from passing their card to a second person to enter the same controlled area.
4. The Access control system should have user identification and reports.

## 6.7 FIRE DETECTION SYSTEM

### 6.7.1 Requirements for each structure – all buildings

1. The *Contractor* shall design, supply, install and commission a fire detection system for the whole building.
2. Fire detection system will be supplied by the *Contractor* based on the fire rational the Deemed to Satisfy Design in accordance with SANS 10400 and SANS 10139 as supplied by the *Contractor*. The biometric access systems shall be integrated with the system CBMS based on the BACnet, LonWorks or Modbus protocol to enable the monitoring and control. Fire detection will be integrated to the fire detection ring via the XLS- Net protocol (Honeywell proprietary) protocol or hardwire to a suitable existing fire detection panel in a building in close proximity.
3. The *Contractor* is required to cooperate with *Others* to integrate requirements and provide a fully functional system.
4. The fire detection system shall be capable of detecting any fire threats and notifying personnel in the vicinity of the building about the threat, and it should be interfaced with the station's fire detection system for the notification to be repeated at permanently manned locations (fire station, access control room) – refer to the Fire Detection Requirements for Medupi Power Station.
5. In the event of a fire threat the Fire Detection System shall shut down HVAC system to reduce the spreading of fires. It shall also disengage the access control system to provide personnel in the building means to exit the building.

## 6.8 ELECTRICAL WORKS

### 6.8.1 General Requirements for each structure – all buildings

1. The *Contractor* shall design, supply, install and commission all electrical work, Cabling, cable terminations, earthing and lightning protection, lighting and small power for a complete functional system.

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2. Unless otherwise specified, all electrical equipment necessary for the safe and efficient working of this plant shall be provided by the *Contractor* in terms of this Specification and the requirements as specified in relevant standards. This includes all electrical and auxiliary equipment as is necessary for the proper operation of the plant.
3. Templates to be utilised for Load List, Cable and Terminations schedules 240-56227927, 240-56176097 and 240-77302094 respectively
4. Where discrepancy exists between the requirements in this section and the Eskom standards, the *Contractor* shall raise a technical query for clarification. Develop quality control documentation (e.g., inspection test plans) and submit to the *Project Manager* for review and acceptance before construction or procurement of all equipment.
5. The responsibility is on the *Contractor* to advise the *Project Manager* of power supply requirements for all equipment that shall ensure the Plant can be operated.

#### **6.8.2 Construction power supply – all buildings**

1. Eskom will allocate space on existing points of power supply within an area of 300 meters from the construction site. The supply, termination and pulling of cables from these allocated points of power supply will be in the *Contractor's* scope of work. In the event that no power supply is available within 300 meters of the construction site an 11kV/400V Minisub will be free issued to the *Contractor* to install in the area and connect up to the existing construction ring. The *Contractor* will be responsible for the installation of this minisub and the permit to work required for 11kV installations. It is also the responsibility of the *Contractor* to remove all temporary cables upon completion of the works.
2. The *Contractor* shall run the cable through sleeves, cable tunnels and on the ground or empty racks if any is available.
3. The *Contractor* shall determine the exact length of the cable on site.
4. The *Contractor* shall install warning signs for cables running above the ground.
5. The *Contractor* shall terminate all the cables and use the correct size glands, shrouds and lugs.
6. The *Contractor* shall walk the proposed cable route with an Eskom supervisor prior to the installation of the cables.
7. The *Contractor* shall add any additional work that might be required for the installation.
8. The *Contractor* shall ensure that all electrical installations comply with the Occupational Health and Safety act 85 of 1993, under construction sites and construction distribution boards as well as SANS 10142-1.
9. The *Contractor* shall issue a COC for the newly installed DB.

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### 6.8.3 Lighting and Small power – all buildings

1. The following lightning and small power requirements are to be utilised for every building as a minimum. Any building specific requirements will be given under each building section:
  - a. Temporary construction lighting and small power shall be provided by the *Contractor*.
  - b. The *Contractor* shall design, manufacture, install and commission lighting and small power for the buildings that will include:
    - i. At least one single phase 16A 230V plug outlet per room, the plug outlet will be provided every 10m on every wall and 1m above the floor.
    - ii. Internal lighting designed to integrate with the installation arrangement of the equipment.
    - iii. External/peripheral lighting that illuminate at least the walkway and landings of the building.
    - iv. Emergency lighting in the buildings.
  - c. All electrical equipment selected for the classified areas must comply with the area classification requirements and applicable standards. The design must cater for minimising the electrical equipment in hazardous zones by locating this equipment in less hazardous zones.
  - d. Lux levels survey shall be conducted upon completion of lighting installation to ensure or guarantee that the illuminance meets the requirements of South African National Standards as well as minimum values stipulated by occupational health and safety act.
  - e. The equipment of the same rating should be fully interchangeable to allow for low inventory and reduced down-times.
  - f. No cables or wires are allowed to run on the floor surface.
  - g. The *Contractor* shall submit both manufacturing and construction ITPs for lighting and power distribution board for acceptance by the *Project Manager* prior to starting with actual works.
  - h. Factory acceptance testing/inspection is mandatory for small power and lighting distribution board as well as light fittings.
  - i. All lighting and small power designs and installations shall comply with the following standards:
    - i. 240-55714363 Eskom generation Lighting and Small Power Installation Standard
    - ii. Act: Occupational health and Safety
    - iii. SANS 204: Energy Efficiency in Buildings
    - iv. SANS 10142-1: The wiring of premises Part 1: Low-voltage installations

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#### 6.8.4 Earthing and Lightning Protection – all buildings

1. The *Contractor* will be responsible to design, installation, and commissioning of the earthmat and lightning protection for the buildings where required.
2. The *Contractor* shall design earthing and lightning protection systems in accordance with 240-56356396 Earthing and Lightning Protection Standard and 0.84/3482 Medupi Power Station Earthing Standards.
3. The *Contractor* shall earth all installed equipment in accordance with 240-56356396 Earthing and Lightning Protection Standard.
4. The *Contractor* shall perform earthing continuity tests as part of the quality control process and provide an earthing certificate for all tested equipment. The tested earthing points must be marked and recorded for reference purposes (plant earthing maintenance purposes). All installation plans must be submitted to the *Project Manager* for testing witnessing purposes.
5. The *Contractor* shall ensure that all outdoor electrical equipment is weatherproof with at least an IP 65 rating
6. The earthing and lightning protection will be interconnected to the existing power island earthmat. The *Contractor* is responsible to test the integrity of this mat in the area that was worked and repair it if required.
7. The *Contractor* shall clearly define the design, philosophy and implementation (installation) plan with drawings, calculation, software applied and all supporting documentations for:
8. Lightning protection
9. Earthing design

#### 6.8.5 Cabling – all buildings

1. Eskom engineering will allocate a point of power supply from which the *Contractor* will terminate and pull the permanent power supply cable to the distribution board. Cabling shall comply with Eskom specification (240-56227443).
2. The *Contractor* shall determine the cable route from the allocated power point.
3. All electrical equipment selected for the classified areas must comply with the area classification requirements and applicable standards. The design must cater for minimising the electrical equipment in hazardous zones by locating this equipment in less hazardous zones.

#### 6.8.6 Cable servitudes, racking and supports – all buildings

1. Equipment foundations or supporting structures shall be designed to allow for cable access to equipment. Servitudes for all cable routes shall be allocated and are to be shown on plant layout drawings. Separate servitudes shall be allocated for control cables and power cables. The

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minimum permissible spacing between control cable routes and power cable routes shall be 1000 mm and crossings are to be at right angles.

2. *Contractor* shall comply with the requirements for Control and Power Cables for Power Stations Standard (240-56227443).
3. The *Contractor* shall determine the cable route from the allocated power point.
4. The *Contractor* is to procure and install the correct size power cable to feed the main DBs of each building from the allocated power source.

#### **6.8.7 LV Switchgear – all buildings**

1. The electrical power supply allocation will be done by the *Employer*
2. The *Contractor* is to supply and install the correct size bucket for the switchgear that will supply the power to the motors. The *Contractor* is to update all labels on the switchgear where applicable following the KKS standard. The *Employer* shall provide all relevant switchgear documentation once the allocation has been done as per the size of the motors.
3. The *Contractor* shall reseal any fire sealing that had to be damaged by installation of the cables.

#### **6.8.8 Testing and Proof of Compliance – all buildings**

1. The relevant certificates and test reports shall be provided by the *Contractor* to prove compliance to the relevant specifications. If the equipment supplied has been typed tested, type test certificates for that make will be acceptable and do not have to be re-tested.
2. The equipment offered shall be identical to the type of equipment tested. In the event that components differ from the once described in the type test certificates/reports, the components shall be subjected to retesting before acceptance by the *Project Manager*.
3. In addition, the following certification will be required where applicable:
  - a. Electrical CoC

#### **6.8.9 Factory inspection and testing – all buildings**

1. The *Project Manager* shall inspect the Plant in the manufacturer's premises before dispatch and *Contractor* shall advise on a period required for the inspection and testing activities. Allowance shall be made in the delivery time to cater for this requirement.
2. The *Contractor* shall supply a detailed procedure that will be used for Factory Acceptance Tests (FAT's) to be accepted by the *Project Manager*, 30 calendar days prior to starting date of the first

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FAT. The *Contractor* shall also give the *Project Manager* at least 14 calendar days' notice of the date on which the equipment is ready for inspection and testing.

3. If the factory inspection and testing is not to be done within the Republic of South Africa, at least 10 weeks' notice is required.
4. The light fittings that will be used will comply with the testing procedure set out by the small power and lighting Eskom generation Lighting and Small Power Installation Standard (240-55714363)

#### **6.8.10 Component's acceptance – all buildings**

1. All active components of the Plant that do not form part of the OEM's original design shall be subjected to Acceptance by the *Project Manager*. The component shall comply with the relevant requirements of this Specification as a minimum.
2. Where required, the *Contractor* shall provide calculations to prove the component application, design and compliance to the requirements. The relevant schematic drawings shall be used for the acceptance of components application. Should the requirements not meet the component application design requirement, the additional cost is borne by the *Contractor*.
3. Original copies of the technical documentation of each component shall be provided in a file complete with contents list with all calculations per component. A copy of filed labelled Components Acceptance File shall be submitted in the regard.

#### **6.8.11 Factory Inspection and Clearance for Dispatch – all buildings**

1. The *Project Manager* shall be provided with the access to the *Contractor's* requirements on inspections, surveillance and audits.
2. The *Contractor* shall obtain clearance from the *Project Manager* before despatching of the equipment. This factory release inspection shall not release the *Contractor* of any of his obligations under the contract.
3. No plant shall be released for dispatch without the AS MANUFACTURED documentation and drawings accompanying them.

#### **6.8.12 Site testing and commissioning – all buildings**

1. The *Contractor* shall conduct the following tests and checks once the erection of the Plant on site has been completed (as a minimum requirement):
  - a. Settings adjustment, operational checking of each functional unit.
  - b. Checking for any visual damage to the functional units and all other equipment.
  - c. Check tightness (torque where applicable) on all connections.
  - d. Check the fixing and locking devices on doors and covers.

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- e. Repetition of all electrical functional tests where possible.
  - f. Lighting lux level tests.
- 2. The *Project Manager* shall witness the tests and checks.
- 3. Once the Contractor has satisfactorily completed all his tests, the *Project Manager* shall ensure conformance to the relevant specifications. These checks by no means release the Contractor of his obligations to perform all site inspection, testing and commissioning.
- 4. Upon completion of commissioning, the *Contractor* shall provide AS BUILT drawings within a period of 14 Calendar days.
- 5. The *Contractor* shall provide supervision during the erection, installation, site testing and commissioning of the Works. The supervision shall also be available during functional checks.
- 6. Commissioning checks for the complete system will be led by the *Contractor* in conjunction with the *Employer's* commissioning team.

#### **6.8.13 Storage and Preservation – all buildings**

- 1. The *Contractor* shall make provision for storage of the equipment at his premises after the completion of FAT.
- 2. For any equipment procured the OEM storage and preservation requirements should be adhered to.
- 3. Any special storage requirements of the equipment stored should be adhered to.

#### **6.8.14 Document storage building**

- 1. Lighting and Small power:
  - a. The additional requirements for the small power and lighting of the Document Storage building is as follow:
    - i. The *Contractor* shall handover to the *Project Manager* a complete functional small power and lighting system for the document storage building, which includes power distribution board, lighting, switched socket outlets etc.
    - ii. Switched socket outlets shall strategically be positioned in all workstations, admin viewing area, kitchen (for refrigerator and hydro boil), waiting area as well as in the Bulk filters hall/room.

#### **6.8.15 Fire and Medical store**

- 1. The additional requirements for the small power and lighting of the Fire and Medical Store is as follow:

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- a. The *Contractor* shall handover to the *Project Manager* a complete functional small power and lighting system for the Fire and medical store, which includes power distribution board, lighting, switched socket outlets etc.
- b. Switched socket outlets shall strategically be positioned in the storeroom to address any electrical requirements required by the equipment being stored or used in the storeroom.

#### 6.8.16 Secondary Clarifier Substation

1. Lighting and Small power.
  - a. There is no specific small power and lighting requirements for the secondary clarifier substation above the minimum requirements as mentioned in section 6.8.3.
2. Earthing and Lightning Protection.
  - a. The additional requirements for the earthing and lightning protection of the secondary clarifier substation are as follow:
    - i. An earth bar shall be installed in each room within the substation and connected to the earth mat, anti-theft earth cable connection is preferred. The earth bar shall have a reference number as set out by the KKS regulations.
    - ii. Earthing shall be done via a separate conductor and the cable racks are not to be used as earth.
3. Reinstatement of electrical equipment.
  - a. After completion of the secondary clarifier substation the *Contractor* shall execute the following works:
    - i. Remove and reinstall the electrical and control equipment from the temporary container substation.
    - ii. Earth all equipment.
    - iii. All cables to be rerouted to the new substation and be terminated as per original cable design.
    - iv. The cables should be dressed on racks at the bottom of the substation; the racking will be designed, supplied and installed by the *Contractor*.
    - v. All cables shall be made off to the correct lengths and cable termination and installation shall be done according to Control and Power Cables for Power Station Standard (240-56227443).
  - b. If during quality control checks it was found that a cable is damaged and needs to be replaced the *Contractor* shall make provision for replacing such a cable with acceptance from the *Project Manager*.

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- c. The *Contractor* shall make provision for joining of cables and adding additional lengths if needed.
- 4. Quality checks:
  - a. The *Contractor* shall follow the quality process when re-instating the plant.
  - b. On the 400V Switchgear assurance check for protection only will be performed by others.
  - c. The electrical power cables should as a minimum be insulation resistance tested to assure the integrity of the cables and correct source and destination terminations.
- 5. Plant Labelling.
  - a. The Electrical and C&I equipment installed are fully labelled and labelling should be maintained as is. The *Contractor* should make provision for replacement of any lost or damaged labels.
  - b. The *Contractor* should label all new equipment procured.

## 6.9 CONFIGURATION MANAGEMENT REQUIREMENTS

### 6.9.1 Requirements for each structure – all buildings

- 1. Configuration Management requirements shall apply to all buildings covered under this scope of work.

### 6.9.2 Configuration Management Plan – all buildings

- 1. The *Contractor* shall prepare a Configuration Management (CM) plan utilizing the iso 10007 as a reference guide for under this scope of work. The CM plan shall include the following:
  - a. A complete and comprehensive description of the *Contractor's* document numbering conventions and revision schema.
  - b. A description of the electronic data management system(s) that the *Contractor* will use for the management of documents and/or configuration items.
  - c. A description of the baselines that will be established and the content of these baselines.
  - d. The release procedure for product configuration information.
  - e. The procedure for the control of changes prior to the establishment of baselines as well as after.
  - f. The method for processing changes, emanating both internally and from sub-suppliers.
  - g. The method for collecting, recording, processing and maintaining the data necessary for producing configuration status accounting records.
  - h. The definition of the content and format for all configuration status accounting reports.
  - i. A list of audits which will be conducted to ensure adherence to the CM plan.

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### 6.9.3 Plant Designation

1. The *Contractor* shall apply the Kraftwerk-Kennzeichensystem (KKS) codification system to uniquely identify the systems, components and sub-components constituting the plant.
2. It is the *Contractor's* responsibility to code, generate an equipment list, assign codes on the drawings and label the plant.
3. The *Contractor* shall ensure that the plant aligns with the documentation and conduct a KKS pre-inspections before making a final booking for KKS inspection.
4. The *Contractor* shall identify all plant indicated or referenced by documentation by the plant's unique KKS codes within the documentation itself.
5. The *Contractor* shall ensure that the codification assigned to plant is consistently maintained throughout the design cycle, e.g., the KKS codes indicated in the O&M manuals are consistent with the KKS codes indicated in the original process and instrumentation diagram.
6. The *Project Manager* shall supply the *Contractor* with a system-level plant breakdown structure (PBS) of the existing plant at the site, as well as a preliminary system-level plant breakdown structure of the plant within the *Contractor's* scope at contract initiation. The *Contractor* shall review the PBS to ensure alignment with the *Contractor's* design philosophy and shall expand the PBS to the complete system level (Fn level of the KKS hierarchy). The *Contractor* shall provide a complete system-level PBS with the submission of the process flow diagrams of the plant within the *Contractor's* scope.
7. The *Contractor* shall codify all equipment, and any components which are required to be codified as per the guidelines and standards referenced in this document. The *Contractor* shall indicate equipment and component codification in drawings and documents indicating or referencing such plant.
8. As minimum all plant shall be coded as Process Related Coding (mainly P&ID's), Point of Installation coding (Electrical switchgears and C&I) and Location coding (Civil Coding). Process and Point of Installation shall be coded to breakdown level 3, Location coding shall be coded to breakdown level 2.
9. The *Contractor* will submit all KKS codes designated by the *Contractor*, with the documents in which they were originally designated, to the *Project Manager* for review. The *Contractor* will remain responsible for ensuring that the codes designated are unique and meet the requirements established by the various standards applicable to the project. Where any ambiguities or doubts with regards to KKS codification exist, the *Contractor* will engage the *Project Manager* for resolution.
10. The *Contractor* shall ensure that the ergonomics requirements specified under 5.4 of the KKS Coding and Labelling Standard (200-3340) is achieved.

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#### 6.9.4 Plant Labelling

1. The *Contractor* shall manufacture and install labels according to the Medupi Label specification, 200-3340.
2. Any abbreviations to plant descriptions shall be prepared in accordance to the *Employer's* abbreviation standard, 200-5343.
3. Detailed equipment list or label lists with the service legends and including the KKS Code shall be prepared by the *Contractor* and submitted to the *Project Manager* for review and comment before commencing the manufacture of the labels. On plant areas where labels do not make ergonomically sense please consult site Configuration Management for guidance.
4. It is the *Contractor's* responsibility to book for KKS inspections according to the Issuing of KKS Certificate Work Instructions (200-94660) and conduct pre-booking inspections to ensure that documentation aligns with the plant.
5. The *Contractor* shall ensure that the ergonomics requirements specified under 5.4 of the KKS Coding and Labelling Standard (200-3340) is achieved. The *Contractor* shall be responsible to ensure that labels are fixed in such a way that operation and maintenance is not hampered, and the labels are visible. Where the fixing method is not clear (deviation from the norm) the *Contractor* shall propose a solution to fix the labels which will have to be reviewed and accepted by Configuration Management before installation. Acceptance of the fixing method by Configuration Management shall not absolve the *Contractor* from his/her responsibility to ensure that the fixing method will remain intact for the life of the plant.

#### 6.9.5 Plant Designation with Documents

1. The *Contractor* shall prepare a list of KKS designations allocated to components for each scope of delivery or system (this list will be referred to as equipment list for simplicity's sake, but includes documents such as cable schedules, valve schedules, etc.). The equipment list shall be submitted with the original implementation documentation describing the design of the system (e.g., process and instrumentation diagram, single line diagram, etc.). The *Contractor* shall ensure that the equipment list accurately represents the implementation documentation which it accompanies. The content of the lists will be agreed to per discipline with Configuration Management. As a minimum, the equipment list shall include:
  - a. The KKS designation of all components within the relevant scope or system.
  - b. The full description of each component, compiled according to the standards referenced in this document.
  - c. The abbreviated description of each component, utilising abbreviations as listed in the referenced project abbreviation list, and abbreviated to a number of characters as

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required by the project digital control system and as per the label requirements in, 200-3340;

- d. The acceptance status of each component, in alignment with the list of acceptance statuses specified for document.

## 6.10 QUALITY MANAGEMENT SYSTEM

1. The Contractor shall be certified and demonstrate compliance to the latest version of the ISO 9001 Quality Management Systems standard and comply with the quality requirements as stated in 348-389557 Medupi Contractor Quality Specification and Supplier Quality Management Specification 240-105658000.
2. The Contractor shall implement the requirements of the latest revision of the 348-389557 Medupi Contractor Quality Specification in its entirety, and have the following documented information as a minimum:
  - a. Project Quality Policy
  - b. Project Quality Strategy
  - c. Project Quality Objectives
  - d. Project Quality Management Plan
  - e. Project Organisation Chart.
  - f. Project RACI Matrix – may be split by Dept. /Phase/Discipline as required.
  - g. Job Descriptions including performance requirements and measurements.
  - h. Equipment and Process Criticality Ratings,
  - i. Project Quality Assurance Plans – per project phase:
    - i.Design
    - ii.Manufacturing, Inspection and Testing
    - iii.Construction, Inspection and Testing
    - iv.Commissioning and Taking-Over
  - j. Project Quality Control Procedures - per discipline:
    - i.Civil and Structural works.
    - ii.Mechanical, Piping, Painting and Insulation works.
    - iii.Electrical works.
    - iv.Control and Instrumentation works.

### 6.10.1 Inspection

1. Inspection activities during manufacturing shall be managed according to the Medupi Manufacturing Inspection and Testing Procedure 200-45965.

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2. Inspection activities during construction shall be managed according to the Medupi Site Quality Assurance Control and Verification Procedure 200-46362.
3. The Contractor shall be required to maintain inspection databases where all records of inspection are maintained as required in the Medupi Quality Specification 200-1689.
4. The Contractor shall provide Index, Method statement, Inspection and Test Plan (ITP) or quality control plan (QCP) for the Works to the Employer's team for review and approval before carrying out any works.
5. Contractor to ensure that all quality management systems are audited, and all inspections are executed in line with an approved QCP/ITP, with all the necessary and appropriately intervention points. The above mentioned also includes to all sub-Contractors documentation under the Contractors responsibility.
6. All documents shall be accepted by the Employers Team prior to any commencement of any works (Permanent or Temporary).
7. All quality procedures and verification points as per the project quality requirements or specifications shall be adhered to.
8. All quality documents and records applicable to this Scope of Works shall be submitted for record keeping.
9. The Employer shall have the right to regularly conduct inspections, assessments, audits, and surveys and perform surveillance of the Contractor and/or Sub-Contractor facilities, sites, premises, records, and documentation (including but not limited to data books) to evaluate their capability to comply with the requirements necessary to conform to contractual and QMS requirements.
10. Contractor audits will be conducted at planned intervals as per Quality Management System Audits Work Instruction 348-80423 by Eskom Quality to verify compliance with agreed requirements.
11. The Employer reserves the right to inspect, at reasonable times, any or all the services performed at the Contractor or Sub-Contractor premises or elsewhere. Verification by Eskom shall not absolve the Contractor of the responsibility to provide acceptable product and / or services, nor shall it preclude subsequent rejection by Eskom.
12. The services must comply with the agreed specifications and requirements and the applicable directives and standards set out in the Contract. Defects notified by the Employer shall be remedied by the Contractor upon demand by the Employer without undue delay and at no extra cost. The Contractor shall continuously monitor and identify non-conformances, both internal and external, as signals of opportunities for improvement making process and other relevant changes to prevent recurrence.

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13. The Employer reserves the right to assess and measure, during the existence of the agreement the qualifications, capability, and competence of the key staff (assigned personnel) in relation to the scope of work and to interview any / all of them to confirm the Quality evaluation.

#### **6.10.2 Data Books**

1. The Contractor shall develop and implement a system for collation of quality verification records, including change management records, Manufacturing, Construction and Commissioning Record Books (Data Books) as specified in the as specified in the 348-389557 Medupi Contractor Quality Specification.
2. Data Books shall be maintained by the Contractor to substantiate conformance to product specifications and requirements. All records shall be safely stored (easily retrievable) following the final completion of the works at takeover. These records shall include as a minimum:
  - a. Quality Management documentation as specified in the 348-389557 Medupi Contractor Quality Specification.
  - b. Safety clearances (to be granted prior commissioning)
  - c. Test certificates
  - d. Construction and as-built drawings
  - e. Statutory certification
  - f. Commissioning Documentation.
3. All manufacturing and construction data books shall be completed and approved when the Contractor applies for final inspection at construction completion.
4. At takeover application, all manufacturing, construction, and commissioning data books shall be completed and approved and handed over to the Project Manager.
5. Contractor shall review data book progressively during 30%, 70% and 100% of the completed work and provide valid comments in the form of comment sheet per each stage of review to the Employer prior Employer's review.
6. No data book shall be reviewed by the Employer without Contractor s reviewed evidence and comment sheet Indicating first review second review with addressed comments and final review.
7. The Contractor shall develop Data book Register and maintain for the duration of the project. The said Procedure shall define format, content and structure of Record books and process of compilation and handover and shall as a minimum conform to the following and Record Books shall be provided by the Contractor for:
  - a. Manufacturing - Prepared for each individual "Purchase Order, Scope of work and employer requirements". Only manufacturing records per discipline e.g., Civil, Structural steel, Mechanical, Electrical, C&I works etc.

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- b. Construction/Erection - Prepared for Each Discipline as in bullet 1, each geographical area for civil works and for systems/sub- systems for mechanical and electrical systems including C&I separately: Commissioning - prepared for each commissioned system.

(Note: Record books shall not be combined on Data Dossier. Manufacturing, Construction/Erection and Commissioning shall be separated.)

- c. The Contractor need not to include documents and drawings etc. that have been approved by the *Project Manager* which are included in SPO and shall instead provide and include an index of such documents in the Record Books on the basis that the originals are in SPO and traceable via the "Index".
- d. Record Book shall be written in English or provided with an English translation
- e. The index of all Record Books shall be submitted to the *Project Manager* for approval.
- f. As the work progresses, Contractor shall compile Record Books progressively with the original material certificates, installation, erection, testing, inspection and change management documents, and shall continuously verify and accurately update via weekly review and spot checking against inspection performed that week.
- g. Contractor shall report the status of Record Book compilation progress at Weekly Progress / Quality Meetings together with the Data book Register.
- h. Record Books shall be endorsed by stamp, date and signature of the Contractor and the Employer signifying completion and accuracy when complete.
- i. Each Record Book shall have cover sheet (With a Sleeve pocket to insert a cover sheet) of A4 size paper and a spine label on which is printed the following:
  - i. Title of Document, Contractor's company logo, Unique number/SPO, Name of Project, Contractors' Job Code, Contractor Document number, Eskom Document Number, System KKS number, System Description, Document type "Manufacturing or Construction or commissioning", Contractor's number, Name of Contractor, Volume Numbering (1 of .... or 1/10) xv. Address of Contractor, Column for signature by Contractor Representative and Employer's representative
- j. All Manufacturing Record books shall be Completed, Approved, and handed over to the Employer not later than (7) Seven days after Delivery Inspection on site Prior Installation/Construction Phase.
- k. All Construction Record books shall be Completed, Approved Safety Cleared, and handed over to the Employer not later than (7) Seven days after Final inspection (AFI) Prior Commissioning Phase
- l. For other civil / Earthwork, All Construction Record books shall be Complete, Approved and handed over to the Employer prior taking over section of works.

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- m. All Commissioning Record books, Operating, maintenance and training manuals shall be Completed, Approved, and handed over to Eskom not later than (7) Seven days after the last test prior taking over of completed works (TOC)
- n. Construction Record Book shall be compiled in A4 size with 4-post binders in loose-leaf form with numbered pages such as, Page 1 of 10 or 1/10 whichever sequential counting method that clearly identifies page numbering.
- o. Summary table of each volume's contents shall appear in all volumes. Volumes are to be numbered e.g., 1 of 3, 2 of 3, 3 of 3 etc. both on spine and front cover.
- p. The binders are to be robust and not subject to distortion by impact during shipping. The binders shall not be over filled and contain only a suitable number of documents to enable convenient handling.
- q. Contents shall be sectionalized and separated by properly labelled dividers
- r. Contents shall be placed in the relevant sections and sections shall be separated by properly labelled section dividers/separator sheets easy referencing with going through the content.
- s. All section dividers/separator sheets shall be made of card and shall bear the Section Identifier - 1, 2...
- t. The contents of each section, e.g., Section 1, Section 2, etc., of the Record Book shall be placed directly behind the relevant section dividers/separator sheets and each document shall be clearly marked with the following:
  - i. Relevant section letter, Page number - every document shall receive a page number, in each section the page numbers shall run consecutively.
- u. Record Books shall contain as a minimum:
  - i. All material Reports and Certificates, All Inspection Reports, All Test Reports, All Release Notes, All Change Management Reports, All drawings or an index of drawings identifying drawing No. and revision status, All Defect Reports, All Procedures or an Index of Procedures, All Inspection and Test Plans if used as a Quality Verification Record or an Index of Inspection and Test Plans if used as an assurance and control document, All Drawings or an Index of Drawings.

### **6.10.3 Statutory Records**

1. The Contractor shall submit a statutory compliance file containing minimum applicable documents as follows:
  - a. Electrical Equipment: Statutory register and COCs
  - b. Civil Structures: Statutory register, Professional Engineering Certificates, Glazing Certificates, Sewer Certificates (subjected to exemption).

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- c. Pressurized Equipment: Statutory register, Certificate of Conformance for PER equipment, Inspection and Hydraulic Pressure Test Certificate for PER equipment and Pre commissioning Certificates.
- d. Lifting Equipment: Statutory register – lifting equipment, Statutory register – passenger conveyance lifts, Load test certificates for all lifting equipment's and Transformer Impact Recording, Functional safety clearances for all equipment, Operating procedures, and Maintenance Procedures.
- e. Permanent KKS certificates (no temporary labels to be allowed at take-over)
- f. Software and applications to interrogate the equipment, i.e., power electronics, All the configuration files and settings implemented, FAT, SAT and SIT Reports, CEMS, Dust and gaseous emission correlation tests to be completed.

#### 6.10.4 Handing over of Record books/Data Books by Contractor

1. QA Completeness review:
  - a. After addressing all comments given to the Contractor during QC 100% review of data books by the Employer, the Contractor shall request QA review via *Project Manager* to perform completeness review of the record books.
  - b. The Employer Quality Assurance team will also make reference to the data book checklist (200-616427) for compliance of format and lay out of the Record Book / Data Book.

#### 6.10.5 Storage and Preservation

1. The Contractor shall implement storage and preservation requirements in accordance with the Employer Storage and Preservation Procedure (348-860843).

#### 6.10.6 Quality Payment Schedule

1. The *Contractor* shall ensure that Quality Assurance is performed at all levels and phases of work carried out for the *Employer*.
2. The *Contractor* shall use processes to ensure that quality is built into their products/services i.e. its business processes are organized such that quality is built into the process of producing goods and rendering services. The *Contractor* shall work according to processes.
3. The *Contractor* shall ensure that it can be relied on to deliver quality goods and services without the need for the *Employer* to have to inspect all the time.
4. The *Contractor* shall keep the Quality Table of Payments (Quality Payment Schedule) updated with progressive *Employer* sign-off (as the work is done and payments applications are submitted). This means that as the *Contractor* completes an activity and has the related ITP/QCP signed by the

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*Employer*, the *Contractor* shall bring the Quality Table of Payments to the *Employer's* Quality representative to sign off for that activity.

5. The updated Quality Table of Payments shall accompany all payment applications (proforma invoices). The *Contractor* shall attach the signed (or partially signed if applicable) ITPs/QCPs to the payment application. Payment will only be made if the ITPs/QCPs are signed by the *Employer*.

## 7. DOCUMENTATION REQUIREMENTS

### 7.1 DRAWING REQUIREMENTS

1. Drawings shall be provided for the required equipment. Typical drawings supplied with the tender shall show only the equipment supplied. The drawings located on the tender bulletin are for tender purposes only and will form the basis for the design and also the formatting.
2. The creation and control of all Engineering Drawings shall be in accordance with the latest revision of Engineering Drawing Standard 240-86973501.
3. All required drawings shall be prepared in accordance with the requirements as specified in the Engineering Drawing Office and Engineering Drawing Standard 240-86973501.
4. All P&ID's shall be as per the requirements of the Piping and Instrumentation Diagram (PID) Standard.
5. A drawing register which records the drawing's information shall be maintained by the *Contractor*.
6. All Design change management shall be performed in accordance with the latest revision of the Medupi Engineering Change Management Procedure and the *Project Manager* shall ensure that *Contractor* is provided with latest revisions of this procedure.
7. Reproductive drawings for Acceptance shall be supplied according to the Vendor Document Submittal Schedule (VDSS).
8. The specific VDSS and delivery timeline requirements of design drawings will be agreed with the *Contractor* upon contract award.

### 7.2 GENERAL DOCUMENTATION

1. All documents shall be submitted to the Eskom Documentation Centre in a form of a transmittal, the submission address will be advised by the *Project Manager*.
2. The *Contractor* shall submit Master Document List (MDL) on a monthly frequency, with document titles, document revision, status, transmittal details and project phase. The *Contractor* shall maintain this MDL through the life cycle of the Contract.

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3. Documents and drawings shall indicate the *Employer's* drawing number as allocated by the *Employer*. The *Contractor* may have his own internal document or drawing number on the document or drawing, but where reference is made among documents or drawings, the *Employer's* number shall be used.
4. All drawings shall indicate purpose for issuing (Issued for Information, Construction or As-builts) as applicable and signed off by the professional registered engineer.
5. All design related documentation shall be dated and signed off by the professional registered engineer.
6. The detailed information related to documentation management will be shared with the contractor during the kick off meeting through the Medupi contractor documentation management requirements: 348-10001963. Trainings and information sessions will also be arranged to ensure contractor compliance.
7. Each revision of a document or drawing shall be accompanied with a list of the comments made by the *Employer* on the previous revision if applicable and the response/corrective action taken by the *Contractor*. Changes shall be recorded in a revision table contained on/in each drawing/document.
8. All drawings submission to include PDF and native CAD files.
9. All revised drawings, to cross reference ECN on the title block under revision history. The ECN is as per the engineering change management process and must detail ALL reasons to support the update/revision.

### 7.3 GENERAL ARRANGEMENT DRAWINGS

1. General Arrangement drawings shall be completely dimensioned, showing as a minimum, the following:
  - a. Arrangement of equipment offered.
  - b. Plant, front view, and other elevation views.
  - c. Required clearances for opening doors and for removing components.
  - d. Conduit or cable entrance locations for bottom entrance.
  - e. Cable racking layouts.
  - f. Incoming and Outgoing cable termination positions.
  - g. Earthing connections.
  - h. Mass of equipment. Individual mass of stationary units, if transported separately.
  - i. Details and position of the holding down bolts.
  - j. Floor layout/equipment layout

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- k. Floor slot arrangement
- l. All structural arrangements drawing
- m. Fire layout drawing

#### 7.4 SCHEMATIC DRAWINGS

1. Schematic diagrams shall as a minimum show the following:
  - a. All protection and control devices and their contacts, each of which shall be labelled with its correct ANSI device function number, or reference.
  - b. Device terminal numbers, terminal block numbers and terminal numbers.
  - c. All internal interconnections, bus wiring, inter panel wiring and connections to external equipment.
  - d. All control and protection switches.
  - e. Power supply connection.

#### 7.5 WIRING DIAGRAMS

1. Detailed wiring diagrams shall be drawn to show as a minimum the following:
2. Approximate physical locations of all items in each control panel on a panel arrangement drawing.
3. All interconnecting wiring between control panels.
4. Identification of all terminals, terminal blocks, and wires by numbers.
5. Clear identification, by some distinguishing method, of all wiring which will be installed by the site installation *Contractor*. This shall include, but not be limited to, trip circuits from remote devices and auxiliary contacts to remote devices.
6. This shall also include spare circuits which shall be wired to terminal blocks for future use.

### 8. *CONTRACTOR'S* DESIGN AND CONSTRUCTION PROGRAM

1. The *Contractor* is to, not limited to include the following:
  - a. A resource loaded design and construction program to comply and to meet the project duration specified. The *Contractor's* program shall make provision for *Project Manager's* review, time risk allowances, critical path, float etc.
  - b. An organogram indicating key construction and key design personnel correlated to the program
  - c. List of plant and construction equipment correlated to the program
  - d. Design and analysis software for civil and structural design and drawing processes
  - e. List of construction planning and programming software

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- f. List of other design software

## 9. MAINTENANCE

1. When required, the *Contractor* shall be available during the guarantee period for fault finding on any components related to the equipment provided or work executed.

### 9.1.1 Maintenance plan

1. The Works design shall be performed, and the material selected such that it ensures low maintenance. The *Contractor* shall provide a maintenance plan.
2. The *Contractor* shall also make provision for maintenance spares during the life expectancy of the equipment. The equipment of the same rating shall be fully interchangeable to allow for low inventory in spares and reduced down-times.
3. The maintenance plan shall provide a list of long lead items and recommended spares.
4. Components that have a shorter design lifespan than the specified for the Works shall be identified, and the *Contractor* shall indicate in the maintenance plan the components replacement strategy.
5. A detailed list of spares shall be provided for all electrical components to be supplied.
6. All maintenance required during and after commissioning but before takeover will stay the responsibility of the *Contractor*

### 9.1.2 Maintenance tools

1. The *Contractor* shall provide any special maintenance tools and equipment for the equipment supplied.
2. The numbers of operating and maintenance tool sets shall be specified by the *Contractor*.

## 10. EQUIPMENT AND FURNITURE TO BE PROVIDED BY THE *CONTRACTOR*

### 10.1 LIST OF MECHANICAL EQUIPMENT

1. Mechanical equipment and machinery that shall be supplied and commissioned by the *Contractor*.
2. The *Contractor* shall clarify the details of below provided lists with the *Project Manager* during the design and planning phase of the project.

#### 10.1.1 Document storage building

1. 4 bay - Bulk Filers to accommodate 50 000 databooks

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### 10.1.2 Fire and medical storeroom

1. Sufficient number and sized (3- 5 tiers) of pallet racking for the storeroom
2. Pallet jack and/or counter balance forklift

## 10.2 LIST OF FURNITURE AND APPLIANCES

1. All the quantity of furniture listed here is based on the amount of people to be accommodated in the building, therefore these quantities are minimum requirements:

### 10.2.1 Document storage building

1. Kitchen:
  - a. 1 x fridge
  - b. 1 x single drop in sink
  - c. 1 x 4-seater kitchen table
  - d. Cabinetry - 2m<sup>2</sup> min. counter space required
  - e. 1 x microwave
  - f. 1 x water boiler
2. Toilets:
  - a. 2 x water closet
  - b. 1 x paraplegic water closet
  - c. 2 x wash hand basin with tap
  - d. 1 x paraplegic wash hand basin with tap
  - e. 1 x urinal
  - f. 3 x mirrors
  - g. 2 x toilet roll dispenser
  - h. 1 x paraplegic toilet roll dispenser
3. Waiting area:
  - a. 1 x 2-seater couch (min.)
  - b. 1 x coffee table
  - c. 1 x front/reception desk

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- d. Office area:
- e. 4 x 'D2' workstations
- f. 2 x office cabinets (min.)
- g. 1 x 10-seater meeting table

4. Storage:

- a. Open steel shelves for stationery supply, type of shelving to be according to the designer's design.

5. Bulk filer hall:

- a. Bulk filing units, refer to 6.3.6 for the type of units.

### 10.2.2 Fire and medical storeroom

- 1. Refer to 6.3.7 for shelves required in the storeroom.

### 10.2.3 Secondary clarifier substation

- 1. No furniture required

## 11. EQUIPMENT TO BE PROVIDED BY THE *EMPLOYER*

- 1. Table 5 below lists the equipment installed in the Secondary Clarifier Substation that will be provided to the *Contractor* to complete the scope.

**Table 5: List of Equipment installed in Secondary Clarifier Substation**

Description	KKS	Equipment	Drawing number
400V Secondary clarifier Board	+0 0BHJ	LV Switchgear	0.84/16348
400V/230V Misc. UPS 1 Secondary clarifier	+0 3BRG10 GU001	UPS	0.84/49407
220V DC UPS 1 Battery cabinet	+0 3BTG30 GR001	Battery cabinet	0.84/49412
DCS cubicle	+00CSB41	Cubicle	MED/90/W/-----DC/EA/034
DCS cubicle	+00CSB42	Cubicle	MED/90/W/-----DC/EA/097

### CONTROLLED DISCLOSURE

DCS cubicle	+00CSL71	Cubicle	MED/90/W/-----DC/EA/164
230V Secondary clarifier AC.DC CVT1	+0 6BRE10	UPS distribution	0.84/36041
230V Secondary clarifier AC.DC CVT2	+0 6BRF10	UPS distribution	MED/06/E/BRF10---PR/EA/700
400V Secondary Clarifier Board (0 0BHJ) - Cable Schedule	+0 0BHJ	400V Secondary Clarifier Cables	0.84/47151-SHEET 1

## 12. TRAINING REQUIREMENTS

1. The *Contractor* shall make provision to train the *Employer's* team on the Operation and Maintenance of the structures, equipment, and furniture prior to hand over to the *Employer*.

## 13. CIVIL AND STRUCTURAL DESIGN SKILLS TRANSFER

1. The *Contractor's* designer is required to provide skills transfer for 3 civil engineers from the *Employer's* team. The *Contractor's* designer makes available the design tools, and office space as required to include the *Employer's* engineers in their design activities. The Consultant's senior design engineer is required to provide supervision and guidance to the *Employer's* engineers for the duration of contract. The logistical aspects will be confirmed after appointment.
2. The design engineer will be responsible to assist the Eskom civil engineers to meet ECSA outcomes for professional registration. The program for meeting the outcomes will be discussed and agreed upon between the parties (Design engineer and Eskom civil engineers) before contract award.

## 14. HAND OVER REQUIREMENTS

1. The *Contractor* will provide sufficient documentation at Handover of the complete scope of all the buildings and components indicated in this document to the *Project Manager* for safe and sustainable maintenance and operation of the building and its contained systems. This will include but not be limited to Pre-commissioning reports, Construction handover documentation, Design handover documentation and all statutory documentation.

### CONTROLLED DISCLOSURE

## 14.1 CONSTRUCTION HANDOVER DOCUMENTATION

1. Construction handover documentation shall include but is not limited to the following:
  - a. Safety Clearance Certificates
  - b. Professional Engineering Certificates and professional declarations (issued by the *Contractor's* Professional Engineer\Technologist).
  - c. Data books
  - d. QA will also make reference to the data book checklist [25] for compliance of format and lay out of the Record Book / Data Book
  - e. After addressing all comments given during QC 100% review of data books, the *Contractor* shall request QA to perform completeness review of the record data books.
  - f. The *Contractor* shall request QA to perform completeness review of the record books /Data books prior handing over to the *Project Manager*
  - g. As built documentation
  - h. Master document list per building/system
  - i. Spares lists
  - j. QA Completeness review
  - k. KKS certificates

## 14.2 DESIGN HANDOVER DOCUMENTATION

1. Design handover documentation shall include but is not limited to the following:
  - a. Operating and Maintenance Manuals
  - b. Native/CAD drawing files and pdf
  - c. Computer design models for civil and structural engineering designs
  - d. Fenestration calculation reports
  - e. Structural/building design calculation reports which shall include the following:
    - i. Design philosophy providing
    - ii. Evidence of 50-year design life consideration
    - iii. Evidence that value engineering was considered in the selection of structural system, elements, and materials

### CONTROLLED DISCLOSURE



- iv. Load calculations that include seismic forces, temperature effects, foundation settlement, equipment loading, and all load cases and load combinations as indicated in relevant SANS, ESKOM and other specifications.
  - v. Summary of structural analysis results
  - vi. Summary of structural member design calculations
  - vii. Concrete crack width calculations
- f. Civil design calculation reports.
- g. Other technical/handover documents not listed above.

## 15. DRAWINGS

1. Drawings that will be issued to the *Contractor once appointed* are listed in below table.

**Table 6: Drawings to be issued once contract is awarded**

No.	Drawings Number	Drawing description
<b>Electrical works</b>		
1	N/A	No drawings to be issued once contract is awarded
<b>Mechanical works</b>		
1	0.84/36948 Sheet 1	Unit 2 – Auxiliary Bay Piping General Arrangement
2	0.84/36948 Sheet 2	Unit 2 – Auxiliary Bay Piping Sections
3	0.84/56262 Sheet 4	Fire Water (0 0SGA42) and Potable Water (0 0GKC32) Ring Main (Phase 1)
4	0.84/42707	Ash Washdown – Collection and Treatment Secondary Treatment Plant Fire Water Supply From Station Ring Main
5	0.84/39348 Sheet 1	0 0UEU – Unit 2 Transverse Ash Conveyor Piping GEN ARRGT - Plan
<b>Civil engineering and structural works</b>		
1	0.84/193	Terrace Layout, Contour Plan And Setting Out
2	0.84/198 Sheet 1	Stormwater Layout Terrace And <i>Contractor's</i> Yards
3	0.84/198 Sheet 2	Stormwater Layout Terrace Drainage
4	0.84/198 Sheet 4	Stormwater Layout Terrace Drainage
5	0.84/198 Sheet 5	Stormwater Layout Terrace Drainage
6	0.84/198 Sheet 6	Stormwater Layout Terrace Drainage
7	0.84/198 Sheet 7	Stormwater Layout Terrace Drainage
8	0.84/199 Sheet 1	Stormwater Longitudinal Sections Terrace Drainage
9	0.84/199 Sheet 2	Stormwater Longitudinal Sections Terrace Drainage
10	0.84/199 Sheet 3	Stormwater Longitudinal Sections Terrace Drainage

### CONTROLLED DISCLOSURE

11	0.84/199 Sheet 4	Stormwater Longitudinal Sections Terrace Drainage
12	0.84/199 Sheet 5	Stormwater Longitudinal Sections Terrace Drainage
13	0.84/199 Sheet 6	Stormwater Longitudinal Sections Terrace Drainage
14	0.84/199 Sheet 7	Stormwater Longitudinal Sections Terrace Drainage
15	0.84/199 Sheet 8	Stormwater Longitudinal Sections Terrace Drainage
16	0.84/199 Sheet 9	Stormwater Longitudinal Sections Terrace Drainage
17	0.84/199 Sheet 10	Stormwater Longitudinal Sections Terrace Drainage
18	0.84/199 Sheet 11	Stormwater Longitudinal Sections Terrace Drainage
19	0.84/199 Sheet 12	Stormwater Longitudinal Sections Terrace Drainage
20	0.84/199 Sheet 13	Stormwater Longitudinal Sections Terrace Drainage
21	0.84/199 Sheet 14	Stormwater Longitudinal Sections Terrace Drainage
22	0.84/199 Sheet 15	Stormwater Longitudinal Sections Terrace Drainage
23	0.84/199 Sheet 16	Stormwater Longitudinal Sections Terrace Drainage
24	0.84/199 Sheet 17	Stormwater Longitudinal Sections Terrace Drainage
25	0.84/199 Sheet 18	Stormwater Longitudinal Sections Terrace Drainage
26	0.84/199 Sheet 19	Stormwater Longitudinal Sections Terrace Drainage
27	0.84/202	Typical Cross Section For Terrace And <i>Contractor's</i> Yards Roads
28	0.84/200 Sheet 8	Terrace roads longitudinal section road 5 km 0.000 - km 1.000
29	0.84/200 Sheet 9	Terrace roads longitudinal section road 5 km 1.000 - km 1.364
30	0.84/200 Sheet 11	Terrace roads longitudinal section road 6 km 1.000 - km 1.030 & road 7
31	0.84/200 Sheet 21	Terrace Roads Longitudinal Section Road 38, Road 39a, Road 39b & Road 40
32	0.84/200 Sheet 30	Medupi Power Station Ash Washdown Collection And Treatment Secondary Treatment Plant Roads Long Section Roads 200, 201, 202
33	0.84/200 Sheet 31	Medupi Power Station Ash Washdown Collection And Treatment Secondary Treatment Plant Roads Long Section Roads 204
34	0.84/200 Sheet 32	Medupi Power Station Ash Washdown Collection And Treatment Secondary Treatment Plant Roads Long Section Road 205
35	0.84/200 Sheet 33	Medupi Power Station Ash Washdown Collection And Treatment Secondary Treatment Plant Roads Long Section Roads 203 And 205
36	0.84/241	General Layout Of Sewer Reticulation
37	0.84/242 Sheet 1	Sewer Reticulation Layout - Sheet 1
38	0.84/242 Sheet 2	Sewer Reticulation Layout - Sheet 2
39	0.84/242 Sheet 3	Sewer Reticulation Layout - Sheet 3
40	0.84/243 Sheet 1	Sewer Longitudinal Sections - Sheet 1

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41	0.84/243 Sheet 2	Sewer Longitudinal Sections - Sheet 2
42	0.84/243 Sheet 3	Sewer Longitudinal Sections - Sheet 3
43	0.84/243 Sheet 4	Sewer Longitudinal Sections - Sheet 4
44	0.84/243 Sheet 5	Sewer Longitudinal Sections - Sheet 5
45	0.84/243 Sheet 6	Sewer Longitudinal Sections - Sheet 6
46	0.84/243 Sheet 7	Sewer Longitudinal Sections - Sheet 7
47	0.84/243 Sheet 8	Sewer Longitudinal Sections - Sheet 8
48	0.84/243 Sheet 9	Sewer Longitudinal Sections - Sheet 9
49	0.84/243 Sheet 10	Sewer Longitudinal Sections - Sheet 10
50	0.84/7242-SHEET 1	General Water Layout - Administration Island
51	0.84/7242-SHEET 13	Medupi Power Station Admin Island Clean Stormwater Layout Sheet 1
52	0.84/7242-SHEET 14	Medupi Power Station Admin Island Clean Stormwater Layout Sheet 2
53	0.84/7242-SHEET 15	Medupi Power Station Admin Island Clean Stormwater Layout Sheet 3
54	0.84/7242-SHEET 16	Medupi Power Station Admin Island Clean Stormwater Layout Sheet 4
55	0.84/7243-SHEET 7	Clean Sw Long Sections: Sheet 4 of 5 - Admin. Island
56	0.84/7243-SHEET 8	Clean Sw Long Sections: Sheet 5 of 5 - Admin. Island
57	0.84/7243-SHEET 10	Medupi Power Station Administration Island Package 35 Clean Sw Long Sections Sheet 3 Of 5 For Distribution Pipes
58	0.84/7243-SHEET 11	Medupi Power Station Administration Island Package 35 Clean Sw Long Sections Sheet 1 Of 5 For Distribution Pipes
59	0.84/7243-SHEET 12	Medupi Power Station Administration Island Package 35 Clean Sw Long Sections Sheet 2 Of 5 For Distribution Pipes
60	0.84/7244-SHEET 1	General Sewer Layout-Administration Island & Sandblast Shop
61	0.84/7244-SHEET 2	Typical Sewer Details 1 Of 3 For Distribution Pipes
62	0.84/7244-SHEET 3	Typical Sewer Details 2 Of 3 For Distribution Pipes
63	0.84/7244-SHEET 4	Typical Sewer Details 3 Of 3 For Distribution Pipes
64	0.84/7244-SHEET 5	Sewer long sections: sheet 1 of 2 - admin. Island
65	0.84/7244-SHEET 6	Sewer long sections: sheet 2 of 2 - admin. Island
66	0.84/7244-SHEET 7	Medupi power station admin island and sandblast shop general sewer layout for distribution pipes
67	0.84/7244-SHEET 8	Medupi power station administration island package 35 sewer long sections sheet 2 of 2 for distribution pipes
68	0.84/7245-SHEET 2	Admin island: workshop, canteen, fire and medical platform and roads layout
69	0.84/7245-SHEET 4	Medupi power station administration island workshop, canteen, fire and medical platform and roads layout

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70	0.84/7245-SHEET 5	Medupi power station workshop, canteen, fire and medical road markings parking layout
71	0.84/7245-SHEET 6	Medupi power station workshop, canteen, fire and medical road markings parking layout
72	0.84/7245-SHEET 7	Medupi power station admin island workshop and stores roads setting out layout sheet 2
73	0.84/7245-SHEET 8	Medupi power station admin island workshop and stores roads setting out layout sheet 4
74	0.84/7245-SHEET 9	Medupi power station admin island workshop and stores roads setting out coordinates table
75	0.84/16468-SHEET 1	Ash washdown - collection and treatment secondary treatment plant storm water layout
<b>Building works and architectural finishes</b>		
1	N/A	No drawings to be issued once contract is awarded
<b>Access control</b>		
1	N/A	No drawings to be issued once contract is awarded
<b>Fire detection system</b>		
1	N/A	No drawings to be issued once contract is awarded
<b>Configuration Management requirements</b>		
1	N/A	No drawings to be issued once contract is awarded

2. Drawings that will be issued at tender stage are listed in below table.

**Table 7: List of drawings to be issued at tender stage**

No	Drawing number	Drawing description
<b>Electrical works</b>		
1	0.84/21 (SHEET 0-28)	Station & Unit Mv & Lv Single Line Diagrams
2	MED/00/R/06UBV10--GA001	Secondary Clarifier Temporary Substation Ga
3	0.84/43905	Secondary Clarifier Earth Mat Layout
4	0.84/47151-SHEET 1	400v Secondary Clarifier Board (0 0bhj) - Cable Schedule
5	0.84/47155-SHEET 1	400v Secondary Clarifier Board (00bhj)– Termination Schedule

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6	0.84/16348-SHEET 16	400v Secondary Clarifier Board (0 0bhj) – Heat Dissipation Calculation
7	MED/00/C/----- PR/EG/002	Material Handling And Storage Instructions For C&I Equipment
8	200-53382	C&I Equipment Heat Load Calculation
9	MED/90/E/06UVB--- CA/TC/901	Secondary Clarifier Area Boxes With Interposing Relay Spi Termination Schedules
10	MED/90/E/06BRE10- CA/TC/901	0 6bre10 230v Ac – Secondary Clarifier – Ups1 Spi Termination Schedules
11	MED/90/E/06BRF10- CA/TC/901	0 6brf10 230v Ac – Secondary Clarifier – Ups2 Spi Termination Schedules
12	MED/90/E/06BUE10- CA/TC/901	0 6bue10 24v Dc – Secondary Clarifier – Dc1 Spi Termination Schedules
13	MED/90/E/06BUF10- CA/TC/901	0 6buf10 24v Dc – Secondary Clarifier – Dc2 Spi Termination Schedules
14	MED/90/E/06BUF10- CA/TC/901	0 6buf10 24v Dc – Secondary Clarifier – Dc2 Spi Termination Schedules
15	MED/90/E/06BUE10- CA/TC/901	0 6bue10 24v Dc – Secondary Clarifier – Dc1 Spi Termination Schedules
16	MED/90/E/06BRF10- CA/TC/901	0 6brf10 230v Ac – Secondary Clarifier – Ups2 Spi Termination Schedules
17	MED/90/E/06BRE10- CA/TC/901	0 6bre10 230v Ac – Secondary Clarifier – Ups1 Spi Termination Schedules
	<b>Mechanical works</b>	
1	N/A	No drawings to be issued during tender stage
<b>Civil engineering and structural works</b>		

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1	0.84/202	Typical Cross Section For Terrace And Contractor's Yards Roads
<b>Building works and architectural finishes</b>		
1	N/A	No drawings to be issued during tender stage
<b>Access control</b>		
1	N/A	No drawings to be issued during tender stage
<b>Fire detection system</b>		
1	N/A	No drawings to be issued during tender stage
<b>Configuration Management requirements</b>		
1	N/A	No drawings to be issued during tender stage

## 16. DOCUMENTATION

1. Employer's technical specifications\documents included for tender purposes

**Table 8: Employer's document submission for tender purposes**

No.	Document No.	Title
<b>General</b>		
1	240-53113685	Design review procedure
2	SSZ_45-17	Medupi Power Station Corrosion Protection Specification
3	240-84711933	Medupi Power Station Fossil Fuel Firing Regulations Instruction
4	240-105827236-1	Medupi Power Station Application for Camera Usage
5	240-114967625	Operating Regulations for High Voltage Systems
6	240-150642762	Generation Plant Safety Regulations
7	348-711703 (SSZ 200-207219)	Medupi Power Station Safety, Health and Environmental Specification
8	240-53114002	Engineering Change Management Procedure
9	200-1689	Medupi Quality Specifications
10	200-11303	Medupi Occupational Health, Safety and Management Policy
11	32-421	Eskom Life Saving Rules

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12	BS 001	Building services - Document Storage and Fire Store
15	BS 004	Building services - Clarifier Substation
16	240-86973501	Engineering Drawing Standard
17	200-46362	Site Inspections Procedure
18	200-16817	Excavation Permit Application Procedure
19	PWI 200 – 5664	Engineering Change Management Work Instruction
<b>Electrical works</b>		
1	240-56227516	LV Switchgear Control Gear Assembly Associated Equipment for Voltage 1000V AC and 1500V Standard
2	240-56356396	Earthing and Lightning Protection Standard
3	240-55714363	Generation Power Station Lighting and Small Power Installation Standard
4	240-56227443	Requirements for Control and Power Cables for Power Station Standard
5	240-56176852	Essential Power Supplies for Power Stations Standard
6	240-56355815	Junction Boxes and Cable Termination Standard
<b>Mechanical works</b>		
1	240-56356376	On-Site Commissioning for Low Pressure Systems Standard
2	240-105020315	Standard for Low Pressure Valves
3	240-123801640	Standard for Low Pressure Pipelines
4	240-54937450	Fire Protection and Life Safety Design Standard
5	240-61227631	Piping and Instrumentation Diagram (PID) Standard
6	240-126468603	Operational Standard for Fire Management in Generation
7	240-106628253	Standard for Welding Requirements on Eskom Plant
8	240-70164623	Eskom HVAC Design Guideline
9	240-102547991	General Technical Specification for HVAC Systems Standard.
<b>Civil engineering and structural works</b>		
1	240-56364545	Structural Design and Engineering Standard
2	200-42826	Criteria for Blasting Vibration
3		PROJECT ALPHA: REPORT ON GEOTECHNICAL INVESTIGATIONS AT THE POWER STATION SITE, VOLUME 1

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4	240-85549846	Standard for Design of Drainage and Sewerage Infrastructure
5	240-57127955	Geotechnical and Foundation Engineering Standard
6	348-880042	Medupi Concrete specification for structural concrete (84CIVL053)
7	200-6166	Medupi Power Station Backfill Specification
8	240-57127951	Standard for the Execution of Site Investigations
9	240-57127953	Execution of Site Preparation and Earthworks Standard
<b>Building works and architectural finishes</b>		
1	200-4056	Power Station Architectural Technical Specifications for Structures and other Buildings
2	200-26680	Medupi Power Station Architectural Technical Specification for Structures and Other Buildings
3	84civl007	Architectural Concept
4	240-52599753	Workplace Space and Furniture Standard for Commercial Properties
5	240-52599753	Workplace Space and Furniture Standard for Commercial Properties
6	Policy ESK PB AAQ 3	Interior Specifications for Eskom
<b>Access control</b>		
1	200-100728	Medupi Power Station CBMS Engineering Philosophies and Concepts
<b>Fire detection system</b>		
1	200-63065	Fire Detection Requirements for Medupi Power Station
<b>Configuration Management requirements</b>		
1	N/A	No drawings to be issued during tender stage
<b>Quality management system</b>		
1	200-1689	Medupi Quality Specifications

2. *Employer's* technical specifications/documents that will be issued to the *Contractor* once appointed by the *Employer*.

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**Table 9: *Employer's* document issued to *Contractor* once appointed**

No.	Document No.	Title
<b>General</b>		
1	200-15406	Issue Takeover Certificate
2	240-103414344	Summary of corporate identity manual
<b>Electrical works</b>		
1	240-56227927	Load List
2	240-56176097	Cable Schedules
3	240-77302094	Terminations schedules
<b>Quality management system</b>		
1	200-1689	Medupi Quality Specifications
2	200-90604	NOD Quality Clearing House
3	348-80423	Quality Management System Audits
4	348-106670	Site Quality Assurance Control and Work Instruction
5	348-860842	Manufacturing Inspection and Testing Work Instruction
6	348-860843	Storage and Preservation Procedure
7	348-883554	Corrective Action Request
8	348-883902	Medupi Project Quality Plan
9	348-890104	Control Of Nonconforming Outputs Work Instruction

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17. AUTHORISATION (REV 3)

The document has been seen and accepted by:

Name & Surname	Designation

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The following people were involved in the development of this document and has seen and or accepted the document (REV 1 and 2):

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The following people were involved in the development of this document and has seen and or accepted the document (REV 3):

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## 19. REVISIONS

Date	Rev.	Compiler	Remarks
October 2022 January 2023	0		Issued for review
January 2023	1		Issued for tender
February 2023	2		Cover page updated, item 1.4 removed, Section 17 table updated
August 2023	3		Sandblast workshop and Mill Maintenance workshop removed.  Section 17 and Section 18 changed\updated.  Compressed air and lifting equipment removed.  Section 6.10 general revisions.

## 20. ACKNOWLEDGEMENTS

Not Applicable

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