PART 3: SCOPE OF WORK

Document reference	Title	No of pages
	This cover page	1
C3.1	*Employer*'s Works Information	82
	Total number of pages	82

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

1.1 Overview

The Eskom Kusile Power Station is located in Mpumalanga Province, approximately 23 kilometres south-east of Bronkhorstspruit. The coal fired plant consists of six units, each producing 800 Megawatts (MW) with a gross output of 4 800 MW to the National Grid.

Eskom's objective is to construct and commission a 60 Year Ash Disposal Facility (60 Year ADF) to accommodate ash that will be produced by the power station over its design life of 60 years.

The footprint of the proposed ADF will result in extensive permanent loss of wetlands (both hillslope seeps and channelled valley bottom wetlands). A detailed wetland offset strategy was developed based on the direct and indirect impacts of the ADF construction. In line with this strategy, various interventions are to be constructed and installed in various identified wetland areas.

The scope of *works* to be executed by the *Contractor,* as described in this Technical Specification, covers the *works* within Environmental Management Units A and B, and the Klipfonteinspruit.

This document covers the scope and specifications that will be applicable to the Contract and are to be adhered to by the *Contracto*r in order to meet the *Employer's* objectives for this project.

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

The *Employer*'s objectives and purpose of the *works* are listed as the following:

- To rehabilitate and construct various interventions from detailed wetland offset strategy that was approved by authorities through nationally recognised construction principles and practices.
- To execute the project by means that environmentally friendly practices for the protection of wetlands and the environment in totality.
- To execute the project through safely through approved standard and practices.

1.3 Definitions

The following definitions shall apply.

Table 1: Definitions

Employer	Has the meaning defined in the Contract, including their respective successors, assigns and any persons duly authorized and delegated to act on behalf of the *Employer,* including the *Project Manager*
Project Manager	Means the *Project Manage*r as described in the Contract.

Site	Means the construction Site, as well as all camps, offices and facilities provided by the *Contractor* for the purpose of executing the *works* included in this Contract.
Contractor	Means the *Contractor* engaged under this Contract for the *works* as described in these specifications and the drawings referenced herein.
Subcontractor	Means a subcontractor or their subsidiary engaged by the *Contractor*

1.4 Abbreviations

Table 2 : Abbreviations

Abbreviation	Description
AASHTO	American Association of State Highway and Transportation Officials
ADF	Ash Disposal Facility
AIP	Alien Invasive Plant
ASTM	American Society for Testing and Materials
BoQ	Bill of Quantities
CHSM	Construction Health and Safety Manager
CHSO	Construction Health and Safety Officer
CQA	Construction Quality Assurance
CQC	Construction Quality Control
CMP	Contract Quality Plan
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water Affairs and Sanitation
DSTI	Daily Safe Task Instructions
EA	Environmental Authorisation
EMPr	Environmental Management Programme
EO	Environmental Officer
FEL	Front-end Loader
GA	General Arrangement / General Authorisation
ha	Hectare(s)
HSE	Health, Safety & Environment
ISO	International Standards Organisation
km	Kilometre(s)
MSDS	Material Safety Data Sheet
MSE	Mechanically Stabilised Earth
NB	Nominal Bore

Abbreviation	Description
OHS	Occupational Health and Safety
QA	Quality Assurance
QC	Quality Control
PPE	Personal Protective Equipment
QCP	Quality Control Plan
CQP	Contract Quality Plan
QMS	Quality Management System
SACPCMP	South African Council for Project Construction Management Professions
SAMTRAC	Safety Management Training Course
SANAS	South African National Accreditation System
SANS	South African National Standards
SSO	Significant Safety Occurrences
TLB	Tractor-Loader Backhoe
TRV	Typical Roll Value
WBS	Work Breakdown Structure

1.5 Terminology

"Shall" is used to indicate that the *Contractor* is required to take action.

"Should" is used to indicate that the *Contractor* is advised to take action.

"May" is used to indicate that the *Contractor* is permitted to do something, or that the *Employer* reserves the right to do something, according to context.

"Approved"/"Approval", unless otherwise qualified, means normal, written agreement by the *Employer* to a proposal by the *Contractor*.

"Controlled disclosure" means controlled disclosure of information to external parties (either enforced by law, or discretionary).

1.6 Units

The SI system of metric units shall be used for this Project.

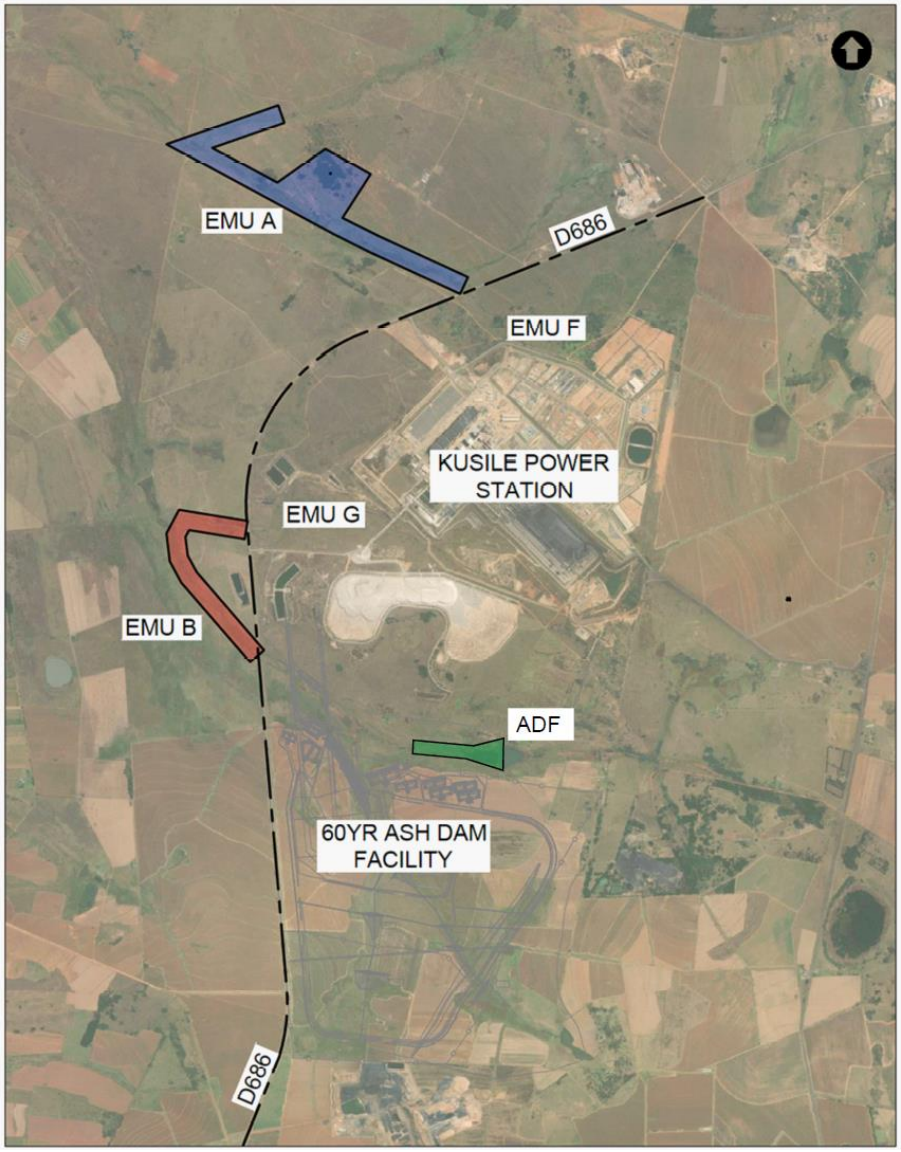
1.7 Language

All data shall be in the English language.

2. GENERAL DESCRIPTION OF SITE

The site is located within Mpumalanga Province, approximately 23 kilometres south-east of Bronkhorstspruit. As shown in **Figure 1** below, the location of the interventions is to the South (ADF), north-west (EMU A) and south-west (EMU B) of Kusile Power Station. Further descriptions, including climatic conditions, adjoining infrastructure, Site access, location of camps and utilities and geotechnical data are included in Part C.4: Site Information.

Figure 1 : Location of Site



Prospective *Contractors* shall visit the Site of the proposed *works* and become acquainted with the nature of the *works*, the conditions under which the *works* are to be performed, the means of access to the Site and with all general matters that may influence or affect the *works*. *Contractors shall* make adequate allowances in their tenders for all costs attributable to or arising from the prevailing Site conditions, including site access.

3. SCOPE OF WORKS

The scope of *works* to be executed by the *Contractor* as shown on the drawings listed under Appendix A includes construction of the following wetland interventions:

3.1 Drop structures

Drop structures have been proposed to elevate the water table within the wetlands, stabilise stream banks, and prevent upstream erosion from encroaching into the wetland areas. The

targeted wetlands are currently incised at the lowest points, with a flow path characterised by banks ranging from 0.5 m to 1 m in depth. This incision has caused a lowering of the water table, which negatively impacts the ecological health of the wetland.

The construction of drop structure walls will predominantly utilise masonry or concrete materials. These materials are preferred over gabions or Reno mattresses, as the latter are prone to corrosion when submerged and require increased maintenance over time. Where gabions or Reno mattresses are specified, they must be galvanised or rubber-coated to mitigate corrosion and protect the integrity of the wire structure.

3.2 Cattle crossings

Cattle crossing locations have been identified to facilitate the movement of cattle across watercourses. Considering that the drop structures in the stream will create a damming effect and raise the water table, the cattle crossings are positioned downstream of the drop structures, where the water level is shallower. Where feasible, the placement of crossings aligns with existing cattle paths.

The design of the crossings involves cutting and stabilising the stream banks to create a slope that allows safe passage for the cattle. The crossings are lined with Reno mattresses filled with rock and topped with a 100 mm layer of concrete to protect the Reno mattress wires from damage. The concrete surface will have a rough finish to prevent cattle from slipping while crossing.

3.3 Head cut erosion protection & reshaping and revegetation

Head-cut erosion has been identified within the wetland areas, where the streambed is eroded in an upstream direction by flowing water, resulting in the formation of erosion ditches or dongas. The severity of head-cut erosion varies across the site.

Several design interventions are employed to mitigate this erosion, including:

- Installing barriers such as cut-off walls, drop structures, or gabion baskets
- Regrading slopes to a 1:2 or 1:4 ratio and installing reinforced geomats along with revegetation, or using geotextiles combined with riprap protection

The preferred solution is determined by site-specific factors such as streamflow volume, flow velocity, and the degree of erosion present.

3.4 Infilling of artificial channels

Artificial channels, likely excavated historically to drain wetland areas for agricultural purposes, are present on-site. These channels will be backfilled manually using previously excavated material available adjacent to the channels or stockpiled materials from other locations. The backfill will be hand-compacted to a level 300 mm above the adjacent land to account for future settlement.

The disturbed areas must be revegetated to restore ecological function, and the slopes at the interface with the stream must be stabilised to prevent further erosion and ensure long-term stability.

3.5 Removal of berms

At certain locations, berms constructed during past farming activities are present. It is proposed that these berms be removed, and the area previously occupied by the berms be revegetated. The material excavated from the berms will either be temporarily stockpiled for use in other areas or permanently stockpiled at an approved site designated by the Client.

3.6 Removal of agricultural scars

Agricultural scars, resulting from historic farming activities, are present in the form of erosion dongas, ditches, head-cut erosion, and berms.

3.7 Removal of existing embankment dam walls

Embankment dams are present within the wetlands, with many showing partial failure. In certain areas, wetlands have naturally re-established upstream of these dams. Additionally, in some locations, cut-off trenches have been excavated to divert water from upstream to downstream dams, effectively redirecting water away from the wetland.

The approach to addressing these old embankment dams will vary depending on the specific site conditions. Generally, this involves removing the embankment wall and stockpiling the material for use at other locations or for final disposal at a dedicated Eskom-approved stockpile area. A flat, dished low point will be created to enable water flow from the wetland to follow its original direction. Special attention will be given to maintaining the correct elevation of the flow path to prevent erosion.

Erosion dongas in the vicinity of the dam walls will be backfilled where feasible. The deactivation and plugging of cut-off or diversion trenches will be addressed in a separate section. All disturbed areas will be rehabilitated and revegetated to restore natural wetland functions.

3.8 Plugging of diversion channels / redirecting flow to wetland

In several locations, cut-off trenches have been excavated to divert water from upstream to downstream dams, redirecting flow away from the wetland. These trenches are to be deactivated, and water flow must be restored to its original path toward the wetland.

Given the length of some cut-off trenches, it may not be feasible to completely backfill them. Instead, it is proposed that the trenches be plugged at 30 to 40 m intervals using previously excavated material, forming berms adjacent to the trenches. These berms should be constructed in a manner that allows overland flow from higher elevations to drain naturally towards the wetland, ensuring proper water distribution across the landscape.

3.9 Retaining of dam wall and formalisation of dam

At site EMU A-09 and ADF-10, embankment dams are present. Given the ecological importance of the upstream wetland that has developed over time, it is proposed that the dams be maintained with specific modifications.

The dam walls have shown signs of overtopping, necessitating the installation of a properly designed overflow/outlet structure at the centre of the dam wall. The dimensions and design of the dam wall, including its height, reinforcement, scour protection, freeboard, spillway width, and location have been included on the specific design drawings.

The spillways have been designed to ensure that outflow from the dam is directed into the wetland and centre of the natural stream downstream of the embankment dams. Additionally, the existing diversion channels will be deactivated to restore natural flow patterns.

3.10 Removal of alien Invasive species

As part of the wetland management interventions, alien invasive species will be removed from designated areas within Eskom property boundaries at sites ADF, EMU A, and EMU B. The precise boundaries of these properties will be provided by Eskom to facilitate the development of detailed layout plans.

The species identified for removal include:

- Blue gum
- Black wattle
- Poplar
- Invasive weeds such as buckweed and others to be confirmed

On-site identification of alien invasive plant species (AIPs) will be necessary, as some areas may have both AIPs and indigenous trees growing in close proximity.

Once removed, the AIP material must be removed from site, and may not be stockpiled on site. All removal of alien vegetation must be undertaken under supervision of suitably trained and qualified individuals. The *Contractor* shall appoint a Pest Control Operator, certified in terms of Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act 36 of 1947.

3.11 Fixing of collapsed bridge / future access

At site EMU A21, an existing embankment dam wall combined with a road crossing is present. The concrete bridge has collapsed due to erosion and undermining of the bridge structure.

The Contractor is to remove the collapsed bridge and replace it with a low-level concrete drift crossing structure. Additionally, on the upstream side of the dam wall, a gabion cut-off wall approximately 2.5 meters in depth, reinforced with geotextile, will be installed. This measure is intended to prevent the loss of fine materials from the dam wall.

3.12 Ameliorate and rehabilitate eroded areas.

In line with the methods described in Sections 3.3 and 3.6, eroded areas will be addressed through the use of erosion blankets and the re-grassing or revegetation of these areas. This approach will stabilise the soil and promote the establishment of vegetation to prevent further erosion.

4. WORK BY OTHERS

While other contractors will be active on and around the site, they will not be working within the wetland areas. The contractor is required to coordinate with these other contractors to minimise potential delays and ensure that their activities do not obstruct each other’s work.

5. GENERAL OBLIGATIONS

5.1 General Obligations of the *Contractor*

The *Contractor* shall manage all persons executing the *works*, including all subcontractors and suppliers undertaking temporary or permanent *works*, or supplying materials to Site.

The *Contractor* shall also cooperate with Others appointed by the *Employer* as well as any third parties involved in or affected by the construction of the *works*, including, but not limited to, the following:

- All officials and employees of the *Employer*.
- All parties acting on behalf of the *Employer*.
- Others that will undertake work prior to or concurrent with the completion of the *works*, as described below.

5.2 Contractor's management, supervision and key people

The *Contractor* shall provide organogram listing management and key personnel including the following:

- Construction Manager (Site dedicated) registered with SACPCMP
- Construction Supervisors (Site dedicated on the activity)
- Documentation Officer
- Environmental officer (Site dedicated)
- Quantity Surveyor
- Quality Officer (Site dedicated)
- Planner
- Safety Officer (Site dedicated) registered with SACPCMP
- Security Officers (Site dedicated)
- Site Foreman (Site dedicated)
- Pest Control Operator as when required

And The *Contractor* shall provide adequate manpower and labour, administration, transportation, tools plant, equipment, materials, fuels, other consumables and the like that are required to complete the full scope of *works* as specified herein and as shown on the drawings listed under Appendix A.

The *Contractor* shall provide and maintain access to the designated construction camp, as shown in Part C.4: Site Information, and temporary access to all parts of the Site. The extent of any temporary roads shall be limited to minimize disturbance of adjoining agricultural and fallow lands, preferably following existing farm tracks.

The *Contractor* shall be fully responsible for establishing all construction utilities, facilities and services that will be required by the *Contractor* for the duration of the works, including offices,

sheds, ablutions, workshops, yards, security and all services at the designated camp site area. This includes all fencing and security measures.

The *Employer* may request that the *Contractor* submit samples of the types of materials to be used. Subject to approval by the *Employer,* such samples shall be retained for reference purpose for the duration of the works. The *Employer* may also request, and the *Contractor* shall provide, relevant certification for such samples, indicating compliance with the technical specifications.

The *Contractor* shall develop and implement quality management and control procedures and conduct regular tests as detailed in these specifications. The outcome of such tests shall be made available to the *Employer* as and when requested. All installations shall be inspected and witnessed by the *Employer* in accordance with this specification and the approved quality control plans for each activity.

The *Contractor* furthermore ensures that:

- All *works* are conducted by competent persons.
- All equipment is maintained in good working order.
- All *works* and associated activities are conducted in compliance with the relevant and applicable legislation, standards and specifications.

All employees engaged by the *Contractor*, including subcontractors and suppliers, shall be made aware of and fully abide by the health and safety and environmental requirements applicable to the *works*.

5.3 Government Acts and Regulations

The *Contractor* shall be responsible for compliance of all *works* with Government acts, by-laws and regulations, including but not limited to the following (including all relevant amendments):

- Occupational Health and Safety Act 85 of 1993.
- National Environmental Management Act 107 of 1998.
- National Environmental Management Waste Act 59 of 2008 (NEMWA).
- NEMWA National Norms and Standards (GN R 634, 635, 636) (2013).
- National Water Act 36 of 1998.
- Atmospheric Pollution Prevention Act 45 of 1965.
- Environmental Conservation Act 73 of 1989.
- Promotion of Access to Information Act 2 of 2000.
- National Road Traffic Act 93 of 1996.
- National Heritage Resources Act, (Act 25 of 1999).

The *Contractor* shall follow the requirements of the General Authorisation, Environmental Authorisation and Environmental Management Programme (EMPr) as listed under Section 8.1 below, as well as any other legislative requirements.

5.4 *Employer's* Standards

The *Contractor* shall become familiar with and abide by the following Employer standards.

- AB-Z-Z-AN-0001: Kusile User Requirement Specification, Rev 0.
- 146838.23.0200: Kusile Project Design Manual.
- 240-93576498 KKS Coding Standard.
- 32-727 Safety, Health, Environment and Quality Policy/Procedure.
- ENV13-R019 Water Management Policy.
- 32-1163 Eskom Water Management Policy.
- 32-245 Waste Management Standard.
- 240-100457704 Electronic Storage and Archiving of Technical Documents and Records Standard
- 240-58552870 Smartplant For Owner Operators (SPO) Documentation Metadata Standard
- 240-86973501 Engineering Drawing Standard – Common Requirements
- 240-44174997 Long term documentation preservation standard

5.5 Precedence

The sequential order of precedence for this project is as follows:

- Regulatory requirements and permits as outlined above.
- *Employer's* standards.
- *Works* Information.
- These construction technical specifications.

In the event of an inconsistency, conflict or discrepancy between any of the standards, specifications and regulations, the most stringent and safest requirement applicable to the project shall prevail. Any inconsistencies critical to the design shall be brought to the attention of the *Employer* for resolution, prior to construction.

5.6 *Employer's* Design

The *Employer's* designs are incorporated in the list of drawings appended under Appendix A. The *Employer* grants the *Contractor* copyright of design data presented to the *Contractor* for the purpose of the *works* only.

5.7 Publicity and Photographs

The *Contractor* shall not be permitted to take any photographs of the Site without proper prior authorisation from the *Employer*, or publish any photographs unless these have been scrutinised and approved by the *Employer*.

The *Contractor* shall also refrain from making any statements or engaging with the media on any matter relating to this project, without the express written consent of the *Employer.*

5.8 Materials and Equipment provided by the Employer

None.

5.9 Daily Site Records

The *Contractor* shall keep daily records of all manpower and equipment on Site, including descriptions of all ongoing construction activities. Copies of these records shall be forwarded to the *Employer* on a daily basis.

Regular progress reports shall also be submitted to the *Employer*.

5.10 Survey Control and Setting out of the *Works*

The *Contractor* shall appoint a competent surveyor to properly set out all *works*. Should the *Employer* not be satisfied with the setting out details, the *Employer* may request that an additional surveyor be appointed to validate all setting out coordinates and elevations.

Permanent benchmarks shall be set out and a photographic record submitted with as-built data.

5.11 Investigations and Surveys

The *Contractor* shall mark out each intervention and provide a benchmark topographic survey at each intervention from which remeasurable payment certificates will be based.

5.12 Excavations and Water Control

It is the responsibility of the *Contractor* to ensure that all excavations are rendered safe and suitable for construction. The *Contractor* shall not continue construction in conditions that the *Employer* does not approve of. The *Contractor* shall submit for approval by the *Employer* the proposed methods of excavation.

The *Contractor* shall request and apply for excavation permit before the commencement of any excavation.

The *Contractor* shall submit a drainage water control plan to the *Employer* prior to undertaking any water control activity. The *Contractor* will only be allowed to construct such drainage water control systems once the design is approved by the *Employer.*

5.13 Control of Noise, Dust, Water and Waste

The *Contractor* shall take all reasonable steps to contain unacceptable levels of noise and dust, in accordance with the specified and referenced environmental, health and safety requirements.

The control of water during construction, including in particular dewatering of excavations, shall be managed and controlled in accordance with method statements to be compiled by the *Contractor* and approved by the *Employer* prior to the commencement of work. These method statements shall include all measures that are required to remove or mitigate adverse environmental impacts.

The *Contractor* shall dispose of all waste products at an appropriately licensed and suitably located waste disposal site, to be approved by the *Employer.*

5.14 Giving Notice of Work to be Covered Up

The *Contractor* shall notify the *Employer* prior to covering up any of the completed *works* and shall allow the *Employer* sufficient time for inspection of those *works*. This shall include, but not be limited to all barrier systems, buried pipelines, cables, service ducts, manholes, layerworks, foundations and concrete *works*.

5.15 Completion, Testing, Commissioning and Correction of Defects

The *Contractor* shall have done everything required to provide the *works* on or before the Completion Date and certain individual items ahead of the Sectional Completion dates, as stated in the Contract Data.

Reference shall be made to the specifications for sampling and testing requirements.

Should the *Contractor* have to return to the Site after completion of the *works* to carry out an improvement or repair, the *Contractor* shall organise access cards for all staff members required to perform the work. The *Contractor* shall also carry the costs of procuring such access.

All installations shall be inspected and witnessed in accordance with this specification, the manufacturer's instructions and recommendations and the approved quality control plans for each activity.

All calibration and test equipment shall hold valid, traceable calibration certificates, which shall be held on Site and shall form part of the quality control dossiers.

All equipment, instruments and accessories shall, where appropriate, be calibrated and tested at the manufacturer premises or by a duly authorised representative of the manufacturer.

All test and calibration certificates shall be included in the on Site quality control dossiers and the as-constructed data packs.

All *works* shall be performed to the specified standards or consistent with recognized, good industry norms and practices, to provide the *works* in a complete, fully functional, operable and compliant manner.

6. MEETINGS

Regular meetings to be convened and chaired by the *Employer* are as follows:

Table 3 : Scheduled Meetings

Title and purpose	Approximate time & interval	Location	Attendance by:
Project progress meeting	Weekly, To be Advised	TBC	*Employer, PM, Contractor, Supervisor,* and Others as per the invite from t*he Project Manager*
Daily Construction Production meeting	Daily or as advised by the *Project Manager*	TBC	*Employer, PM, Contractor, Supervisor,* and Others as per the invite from t*he Project Manager*

Title and purpose	Approximate time & interval	Location	Attendance by:
Risk register, Early warnings and compensation events	Bi- weekly, To be Advised	TBC	*Employer, PM, Contractor, Supervisor,* and Others as per the invite from t*he Project Manager*
SDL&I Progress Meeting	Monthly ,To be Advised	TBC	*Employer, PM, Contractor, Supervisor,* and Others as per the invite from t*he Project Manager*
Commercial and Assessment meeting	Monthly, To be Advised	TBC	*Employer, PM, Contractor, Supervisor,* and Others as per the invite from t*he Project Manager*
Quality meeting	As advised by the *Project Manager*	TBC	*Employer, PM, Contractor, Supervisor,* and Others as per the invite from t*he Project Manager*
SHE meeting	As advised by the *Project Manager*	TBC	*Employer, PM, Contractor, Supervisor,* and Others as per the invite from t*he Project Manager*
Integration meeting	As advised by the *Project Manager*	TBC	*Employer, PM, Contractor, Supervisor,* and Others as per the invite from t*he Project Manager*
Planning meeting	As advised by the *Project Manager*	TBC	*Employer, PM, Contractor, Supervisor,* and Others as per the invite from t*he Project Manager*
Document Management	Adhoc	TBC	*Employer, PM, Contractor, Supervisor,* and Others as per the invite from t*he Project Manager*

Without limiting the nature of the matters to be discussed at these meetings, if the actual progress of the *works* is at any time unsatisfactory, the *Employer* is entitled to call on the *Contractor* to advise the reasons for the foregoing and to make proposals for corrective action to be taken.

The *Employer* is entitled to call meetings required by the applicable law or otherwise required by the *Employer* in connection with the *works*. Meetings are conducted at the Project Site or at another location directed by the *Employer*.

Meetings of a specialist nature may be convened as specified elsewhere in this Technical Specification or, if not so specified, by persons and at times and locations to suit the parties. Records of these meetings shall be submitted to the *Employer* by the person convening the meeting within five days of the meeting.

Unless otherwise approved by the *Employer*, meetings called by the *Employer* where the *Employer* requires the *Contractor* to be present, whether scheduled or otherwise, shall be attended by the duly authorised *Contractor*'s representative.

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

7. SAFETY MANAGEMENT

7.1 General

The *Contractor* shall be solely responsible for carrying out the *works* under the Contract, having the highest regard for the health and safety of its employees, the *Employer's* personnel and persons at or in the vicinity of the Site, the *works*, temporary *works* or the property of third parties engaged in carrying out their obligations under this Contract.

The *Contractor* shall initiate and maintain safety precautions and programs to conform to all applicable Health and Safety laws or other requirements, including, but not limited to the following:

- Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and Regulations.
- Construction Regulations 2014 (No R.84, 7 February 2014).
- Project and Construction Management Professions Act 2000 (Act No 48 of 2000).
- Eskom Doc 240-163062107: Kusile 60 Year ADF Project SHE Specification.
- Eskom Doc No 32-727: Safety, Health, Environment and Quality Policy.
- Eskom Doc No 240-70044602: Baseline Risk Assessment.

7 days prior to the commencement of any *works* on Site, the *Employer* will submit a notification of construction work to the Department of Employment Labour.

The *Contractor* shall provide adequate safeguards for the protection of workers and the public and identify and manage all reasonably foreseeable hazards created by performance of the *works*, to include, but not limited to, the following:

- Provide all things and take all measures necessary for maintaining proper personal hygiene, ensuring safety of persons and property and protecting the environment at or near the Site.
- Avoid unnecessary interference with the passage of people and property at or near the Site by implementing an appropriate Traffic Management Plan.
- Prevent nuisance and excessive noise and unreasonable disturbances in performing the services.
- Be responsible for the adequacy, stability and safety of all of its Site operations, of all its methods of design, construction and work and be responsible for all of the *works*, irrespective of any acceptance, recommendation or consent by the *Employer*, its agents or any government body.

7.2 *Contractor's* Health and Safety Plan

The *Contractor* shall, prior to commencement of the *works*, provide a sufficiently documented and coherent Site-specific health and safety plan, based on the documents as listed above, which must be approved by the *Employer* prior to commencement of the *works*. This plan shall be reviewed and updated as the *works* progress.

The plan shall cover all activities that will be carried out on Site, from mobilisation and set-up through to rehabilitation and decommissioning. Reference shall be made to the *Employer's* Baseline Risk Assessments, compiled in accordance with the OHS Act 85 and the Construction Regulations 2014. The plan shall demonstrate the *Contractor's* commitment to health and safety and shall, as a minimum, include the following:

- A copy of the *Contractor's* health and safety policy and objectives, in terms of Section 7 of the OHS Act 85.
- Procedures covering hazard identification and risk assessments.
- Applicable legal and other requirements, including measures to ensure compliance with these requirements.
- Measures to ensure that HSE information is accessible to relevant personnel.
- Assignment of specific health and safety responsibilities to individuals in accordance with legal or project requirements, including the appointment of the registered Construction Manager with SACPCMP, registered health and safety officers with SACPCMP, supervisors, health and safety representatives and first aiders.
- Training and awareness systems to ensure that each employee is suitably trained and competent, including procedures for identifying training needs and providing the necessary training.
- Communication, participation and consultation arrangements covering health and safety, safety observations, coaching, toolbox talks, daily safe task instructions, project health and safety meetings and notice boards.
- Project-specific documentation required for the effective management of health and safety on the project, including processes for the control of these documents.
- Processes and procedures for maintaining safe work procedures, for effectively managing health and safety risks, particularly critical risks associated with working at heights, confined spaces, mobile equipment and light vehicles, lifting operations, hazardous chemical substances, grinding, cutting, welding, radiation and the like.
- Public safety.
- Emergency preparedness and response procedures.
- Management of change to ensure that health and safety risks are considered before changes are implemented.

- Sub-contractor alignment procedures for the assessment of sub-contractors and suppliers with regard to health and safety requirements and performance before contracts or purchase orders are awarded.
- Measuring and monitoring plans, including a health or hygiene plan/program for measuring and monitoring of employee exposure to hazardous substances or agents (e.g. noise, dust, etc.) in order to determine the effectiveness of control measures.
- Incident reporting and investigation procedures, describing the protocols to be followed with regard to incident reporting, recording, investigation and analysis.
- Non-conformance and action management procedures concerning the management of corrective actions.
- Performance assessment and auditing procedures concerning health and safety performance reporting, monthly internal audits to assess compliance with the project health and safety requirements, daily Site health and safety inspections and management review processes to assess the effectiveness of health and safety management efforts.

The *Contractor* shall also ensure that all subcontractors are suitably qualified and competent to execute the *works* and have the resources required for implementation of the health and safety plans.

7.3 Site Supervision

The *Contractor* shall nominate and appoint a responsible person on Site to whom the *Employer* may refer in connection with the *works.* Persons duly authorised, as described Section 16(2) of the OH&S Act 85, shall be nominated for all shifts worked or whilst any activity relating to the Contract is being performed on Site.

The *Contractor* shall ensure that all *works* are supervised throughout by a sufficient number of qualified and competent appointed representatives of the *Contractor*, who have relevant qualifications and experience in the type of work. The *Contractor* shall appoint in writing competent persons to perform the duties of construction manager and assistant construction managers in accordance with Sections 8(1) and 8(2) of the Construction Regulations 2014.

No *works* may commence or continue without supervisory appointees present on Site. The *Contractor's* Site supervisors shall be equipped with a mobile telephone and/or two-way radio or an equivalent communication device so that communication throughout the Contract can be maintained at all times.

The *Contractor* shall provide to the *Employer* a list of names and contact telephone numbers of all *Contractor's* and sub-contractor's contact persons on Site. This list shall be updated as a new *Contractor* or sub-contractor employee commences on Site.

The *Contractor* shall keep a record of all employees, including date of induction, relevant skills and licences, and be able to produce this list at the request of the *Employer*.

The *Contractor* shall complete manning sheets describing the day's activities, labour numbers and classifications and issue these to the *Employer* as requested.

The *Employer's* Site Safety Representative shall be notified of any new starter, to include evidence of induction, as per the Site Induction Application Pack prior to commencement of the *works*.

7.4 *Contractor's* Health and Safety Officer

The *Contractor* shall appoint a full-time Health and Safety Officer for the duration of the Contract, who shall be registered with the SACPCMP as a Construction Health and Safety Manager (CHSM). Construction Health and Safety Officers (CHSO's) shall also be SACPCMP registered for these positions.

At least one full-time Health and Safety Officers must be appointed, with an additional Health and Safety Officer appointed for every 100 additional employees thereafter.

The Health and Safety Officer shall be on Site when the *works* commence at the start of the day and shall remain on Site until all activities for that day (including the activities of sub-contractor) have been completed. A Health and Safety Officer shall be present during all shifts. If *works* are carried out over more than one shift per day, the *Contractor* shall make provision for an additional Health and Safety Officer.

The *Contractor's* Health and Safety Officer shall be responsible for:

- Reviewing all applicable legal and project health and safety requirements and providing guidance to the *Contractor* and sub-contractor personnel, to assist them in maintaining compliance at all times.
- Assisting with the implementation of effective hazard identification and risk management processes for all work to be carried out by the *Contractor*.
- Participating in the baseline risk assessment for the *Contractor's* scope of work (prior to Site establishment) and ensuring that identified control measures are implemented.
- Participating in all task-based risk assessments conducted for the *works* to be carried out by the *Contractor* and ensuring that identified control measures are implemented.
- Conducting health and safety induction training for all *Contractor* and sub-contractor personnel.
- Compiling and maintaining all health and safety related documents and records required of the *Contractor.*
- Communicating relevant health and safety information to the *Contractor's* and sub-contractor's personnel (e.g. incidents and lessons learnt, leading practices, hazards, risks and control measures, etc.).
- Carrying out safety observations and coaching (once per day).
- Evaluating the daily safe task instructions (DSTI's) conducted by the *Contractor's* appointed supervisors and attending at least one DSTI each day.
- Attending monthly health and safety meetings.
- Assisting with the implementation of the *Contractor's* Health and Safety Management Plan and associated Safe Work Procedures.

- Carrying out planned task observations on an ad hoc basis.
- Assisting with the implementation, testing and maintenance of an effective emergency response plan for all *Contractor* and sub-contractor activities.
- Responding to workplace incidents (as appropriate).
- Participating in incident investigations.
- Maintaining accurate health and safety statistics (for the *Contractor* and all sub-contractors) and compiling health and safety performance reports as required.
- Auditing the health and safety management system and workplace activities of the *Contractor* and each sub-contractor on a monthly basis to assess compliance with the project health and safety requirements.
- Tracking and reporting on the implementation of corrective actions (arising from incident investigations, audits, inspections, etc.).

Health and Safety Officers shall be adequately equipped to enable them to perform their duties effectively. Each Health and Safety Officer shall be provided with the following:

- A computer with access to all necessary systems, including access to e-mail and the internet.
- A two-way radio, or other suitable communication channel to be determined by the *Contractor.*

The Health and Safety Officer shall be computer literate, fluent in English, and shall have the following minimum qualifications, training and experience:

- Degree or diploma in health and safety management/ Diploma in Environmental Health
- 2 years' Experience and appropriate training with regard to implementing and maintaining a health and safety management system compliant with national legislation or relevant international standards.
- Experience and appropriate training with regard to construction related hazard identification and risk management processes.
- Competence, experience and relevant training with regard to incident investigation procedures and causation analysis.
- Health and safety auditing experience and training.
- A valid First Aid certificate of competency.
- Fire prevention and protection training.
- A valid driver's licence (light motor vehicle).

Before placing a Health and Safety Officer on Site, the *Contractor* shall forward a copy of the person's CV to the *Employer* for review and acceptance. A proposed candidate may be rejected should he/she not meet the experience and/or qualification requirements, or due to poor work performance on previous projects.

7.5 *Contractor's* Safety Plan

The *Contractor* shall compile hard and electronic copies of the *Contractor's* Safety Plan, including all relevant policies and procedures, and submit these to the *Employer* for acceptance prior to the commencement of any *works* on Site. The *Contractor* shall ensure that its personnel strictly observe and comply with this plan at all times.

The *Employer* or the *Employer's* nominated representative may from time to time request specific safety procedures applicable to defined areas of operation or require the *Contractor* to supplement the Safety Plan, policies and procedures with guidelines and/or operating standards provided to the *Contractor* by the *Employer*. The *Contractor* shall comply with such requests, consistent with the requirements of the Contract.

The *Contractor* shall give prompt written notice to the *Employer* in the event of any objections to the requested supplements, including the reasons for objection.

The *Contractor* shall forward to the *Employer* any updates or revisions to its safety manuals, policies or procedures as soon as practicable following revision or update.

7.6 Performance Measurement and Reporting

7.6.1 Health and Safety File

The *Contractor* shall open and keep on Site a health and safety file, to include all documentation required in terms of the OHS Act and the Construction Regulations. This file must be available for inspection by the *Employer*, the *Employer's* agents or inspectors. This file shall be handed to the *Employer* upon completion of the *works.*

7.6.2 Health and Safety Statistics

The *Contractor* and each of its sub-contractors shall complete and submit health and safety statistics to the *Employer* before mid-day on the Friday of each week. The *Contractor* shall submit monthly health and safety statistics before mid-day on the last working day of each month to the *Employer.*

7.6.3 Safety Management Records

The *Contractor* shall submit to the *Employer* for acceptance a schedule of the specific health and safety records to be maintained for the Contract. As a minimum, such records shall meet the requirements of the applicable legislation. Copies shall be provided to the *Employer* as and when requested.

7.6.4 Safety Audit by the *Employer*

The *Employer* has the right to conduct at any time, and at least once a month, audits and inspections covering the implementation of the Health and Safety Management Plan, ongoing operations, equipment, emergency procedures and the like. The *Contractor* shall fully cooperate with the *Employer's* audits and inspections.

Such audits and inspections shall not relieve the *Contractor* from conducting separate audits and reviews of the *Contractor's* own health and safety performance.

Where such audits or inspections reveal deficiencies in the *Contractor's* procedures, drills, training or equipment, or non-conformances with the *Contractor's* accepted Health and Safety Management Plan, which are of a minor nature, the *Contractor* shall investigate the cause of the nonconformance and initiate corrective and preventive action to rectify any deficiencies as soon as practicable.

Where such audits or inspections reveal deficiencies of a major nature, the *Contractor* shall stop the *works* on the operation/activity concerned, immediately investigate the cause of the nonconformance and initiate corrective actions to rectify such deficiencies and non-conformances to prevent recurrence. These corrective action plans shall be submitted to the *Employer* for review and comment within 24 hours of the audit finding.

Where such deficiencies include an unsafe practice or a breach of statutory requirements, the *Employer* may, in accordance with the General Conditions of Contract, suspend the *works* associated with the unsafe practice or breach until the deficiency is rectified.

The *Employer* will establish a schedule of regular field safety audits which will be based on an audit tool aligned with the *Contractor's* Health and Safety Management Plan and Site operations and activities. The *Contractor's* conformance will be assessed as a percentage and the following actions shall be taken as applicable.

- If the level of conformance is better than 90% it will be considered satisfactory and the *Contractor* shall develop and implement an action plan within 4 weeks, to be reviewed at the next regular audit.
- If the level of conformance is between 75 - 90%, a corrective action plan shall be developed by the *Contractor* and implemented. A follow up audit will be carried out within 2 weeks.
- If the level of conformance is less than 75% the *Contractor* shall investigate the cause/s has been completed and corrective actions have been developed and implemented by the *Contractor.*

The *Contractor* shall provide to the *Employer* at a time to be agreed upon, but not exceeding monthly intervals, a regular status report on all outstanding corrective actions until they are successfully closed out.

7.7 Safety Meetings

7.7.1 Daily Safe Task Instructions (DSTI's)

DSTI's shall be conducted by the *Contractor's* appointed supervisors before the start of each shift, which shall be attended by the *Contractor's* Health and Safety Officer. Attendance records and brief notes shall be kept for auditing and record purposes.

7.7.2 Weekly Safety Meetings

The *Contractor* shall conduct weekly safety meetings with the *Contractor's* employees to foster safety awareness. Copies of minutes and action items arising from such toolbox meetings shall be made available for review by the *Employer*. Such meetings shall, as a minimum, address the following:

- Accident or safety incidents.
- Hazardous conditions.
- Hazardous materials and substances.
- Work procedures.
- Protective clothing and equipment.
- Housekeeping.
- General safety topics.
- Job or work look-ahead issues.
- Safety statistics.
- Significant Safety Occurrences (SSO).

The weekly meetings shall be attended by the *Contractor's* Site Manager and Health and Safety Officer as well as the *Employer* or the *Employer's* nominated representative.

7.7.3 Monthly Safety Meetings

The *Contractor* shall conduct at least one formal safety meeting per month and shall maintain appropriate records of attendance and meeting content. Such meetings may be attended by the *Employer*. Records of such meetings shall be compiled by the *Contractor* and made available to the *Employer*.

7.7.4 Job Safety Analysis

The *Contractor* shall complete a Job Safety Analysis prior to carrying out any operation on Site. The Job Safety Analyses shall be subject to approval of the *Employer.*

7.8 Roles and Responsibilities

7.8.1 Construction Manager

The roles and responsibilities of the Construction Manager include the following:

- Implement the safety management plan and systems.
- Monitor compliance to the established safety management plan and systems.
- Ensure risks are maintained at an acceptably low level.
- Ensure construction management team are competent in executing the work assigned to them.
- Provide planning, organisation, leadership and control.
- Provide particular technical competencies for critical work.
- Provide adequate supervision and control on each shift.
- Regular monitoring and assessment.
- Workplace inspections.

7.8.2 Health and Safety Officer

The Health and Safety Officer's responsibilities are as described under Section 7.4 above.

7.8.3 Site Personnel Responsibility

The Health and Safety Management Plan shall describe the responsibilities of each member of the *Contractor's* team, including site supervisors and workers, to ensure sure that high priority is given towards safety and health matters.

The *Contractor* and sub-contractor's workforce shall at all stages be kept aware of safety related matters, to include supervision, safety notice boards, toolbox meetings and daily pre-start meetings.

8. ENVIRONMENTAL MANAGEMENT

8.1 General

All *works* shall be conducted in accordance with the principles of the National Environmental Management Act, 1998 (Act. 107 of 1998). It is also the responsibility of the *Contractor* to comply and be familiar with all other national governmental, provincial, municipal and local laws, ordinances, regulations, by-laws and acts of parliament, licenses, approvals and permits relating to the environment which are applicable.

The overarching environmental management framework and minimum acceptable standards for the project are documented in the following reports:

- Eskom Doc No 32-727 : Safety, Health, Environment and Quality Policy/Procedure.
- Water Use Licence WUL 06/B20F/CIBG/10792 granted by Department of Water Affairs and Sanitation.
- Environmental Authorisation (EA) 12 /16/3/3/1/1871 dated 27/07/2028 as amended EA - 12/16//3/3/1/1871/AM1 dated 24/05/2023.
- Environmental Management Programme (EMPr) for the Kusile Power Station 60 Year Ash Disposal Facility, as detailed in Zitholele Consulting Report No : 12712-46-Rep-001-EMPr-Rev 1, dated 20 October 2014.
- GGM 0970: Guideline for The Integrated Water and Waste Management Process (specifically Zero Liquid Effluent Discharge, ZLED).
- GN R 704: Regulations on Use of Water for Mining and Related Activities Aimed at the Protection of Water Resources.
- NFPA 241: Standard for Safeguarding Construction, Alteration, and Demolition Operations.
- Series of best Practise Guidelines for Water Resource Protection in the South African Mining Industry.

It is the *Contractor's* responsibility to become familiar with these documents and ensure ongoing monitoring, compliance and adherence to the stipulated requirements. These requirements shall

be applicable to the *Contractor,* including sub-contractors and service providers appointed by the *Contractor.*

A copy of the EA, EMPr, WUL and any other applicable authorisation, permits or licenses documents shall be available on Site at all times. The *Contractor* shall ensure that all personnel on Site (including sub-contractors and their staff) as well as suppliers are familiar with and understand the content of the above documents.

Should the *Contractor* require any information or explanation regarding any aspect relating to the EMPr it will be the *Contractor's* responsibility to contact the *Employer* for advice.

The *Contractor* shall make sufficient budgetary allowances to meet all of the project environmental requirements for the duration of the Contract.

The *Employer* may stop the *works* whenever violations are observed in breach of the EMPr, EA, water discharge requirements, environmental laws or regulations. The costs or delays of any such *works* stoppage, reparation and resultant standby time will be for the *Contractor's* account. Failure or refusal by the *Contractor* to correct the observed violation may result in the termination of the Contract.

8.2 Encroachment of Rivers and Wetlands

The *Contractor* shall confine the movement of all vehicles, plant and equipment to designated routes within the site. All works are to take place within the provided setting out co-ordinates for each intervention. No over excavations, borrow pits, stockpiling or spoiling shall be carried out outside of the designated points. Any and all disturbed soils and grasses (to be kept to a minimum) shall be rehabilitated on completion of each intervention to the satisfaction of the Employer.

8.3 Method Statements

The *Contractor* shall, as required by the EMPr and before construction activities commence, provide environmental method statements for approval by the *Employer.* These shall include, but are not limited to, the following:

- Establishment of construction lay down area.
- Waste management control.
- Storm water management.
- Management of hydrocarbon spills.
- Diesel tanks and refuelling procedures.
- Noise and vibration control.
- Environmental awareness training.
- Emergency procedures for environmental incidents, and any other applicable activity relevant method statement.

The *Contractor* shall identify further activities which may have a potentially adverse impact on the environment and require specific method statements. The *Contractor* shall furthermore define

in writing how each of the impacts will be prevented or managed. Method Statements shall be prepared in accordance with the requirements set out in the EMPr.

Method statements shall be submitted to the *Employer* for approval at least 10 days prior to commencement of any activity. No *works* shall commence until the applicable method statements have been approved by the *Employer*.

Once method statements and/or procedures are approved by the *Employer* it is the *Contractor's* responsibility to make the *Contractor's* staff and sub-contractors aware of the requirements thereof.

8.4 Environmental Officer (EO)

The *Contractor* shall appoint a suitably qualified and experienced, full-time Environmental Officer (EO).

The minimum qualifications of the EO shall include a National Diploma, B.Tech. or degree in Environmental Science or Environmental Management, as well as at least 04 years' experience working in construction projects and working within the wetlands.

The CV of the EO, including copies of qualifications and certificates, shall be submitted to the *Employer* for review and approval. Any replacement of the EO will equally be subject to approval by the *Employer.*

The *Contractor's* EO shall act as the competent person responsible for environmental compliance. The duties of the EO shall include, but are not limited to the following:

- Develop environmental method statements, to be submitted to and approved by the *Employer.*
- Develop environmental checklists, to be submitted to and approved by the *Employer.* Completed checklists shall be regularly submitted to the *Employer* for record purposes.
- Daily, weekly, and monthly inspections of the Site and all working areas.
- Monitor compliance with the EMPr and approved method statements.
- Reporting of environmental incidents to the *Employer.*
- Attendance at meetings, toolbox talks and induction programmes.
- Litter control and ensuring the *Contractor* clears litter from the Site and working areas.
- Ensuring that environmental signage and barriers are correctly placed.
- Perform any other duty as stated in the EMPr.

8.5 Training

All of the *Contractor's* employees shall receive environmental induction training, to ensure that they are aware of their responsibilities and are competent to carry out their work in an environmentally acceptable manner.

Workers shall receive further weekly toolbox talks to be presented by the *Contractor's* EO and covering specific environmental topics that are relevant to their activities. These toolbox talks

shall be supplemented by Site-wide environmental awareness campaigns by the *Contractor* to promote sensitivity to and understanding of environmental management issues.

Training shall cover general environmentally responsible conduct, storage and handling of chemicals and potentially hazardous substances, waste management and prevention of pollution of natural resources. Foremen and Site management personnel must also receive detailed training in respect of the requirements of the EMPr and method statements.

The *Contractor* shall lead all environmental training programmes.

Records of all training shall be kept and will form part of the monthly environmental audits on Site.

Sub-contractors shall be compelled through their Contract conditions to follow all requirements of the EMPr and method statements. The necessary training to their workforce shall be provided by the *Contractor* to ensure that the requirements of the EMPr are met and maintained on Site.

8.6 Incident Reporting

The *Contractor* shall immediately notify the *Employer* of any environmental incidents on Site. The *Contractor* shall be responsible for investigating all environmental incidents, instituting the required remedial measures and issuing of close-out reports. All costs associated with the prevention, control, cleaning and remediation of any environmental incidents, spills or releases resulting from the *Contractor's* activities shall be to for the *Contractor's* own account.

The *Contractor* shall maintain a register of all environmental incidents. All incidents shall be managed according to the Environmental Incident Management Procedure: 240-133087117, Rev 3.

Close-out reports shall be submitted to the *Employer* within 14 days of the occurrence of the incident. Case-specific extensions may be considered at the sole discretion of the *Employer*.

8.7 Waste Management

The *Contractor* shall be responsible for the collection and removal of all waste generated from the Site as a result of Site activities. The *Contractor* shall be familiar with the waste management requirements as outlined in the EMPr and in the Construction of Kusile 60Y ADF Waste Management Plan: 39-01T005

The *Contractor* shall ensure that all waste is removed to appropriate licensed waste management facilities. Proof of such licencing shall be obtained and kept on file, for review by the *Employer.*

A waste manifest shall be retained for record purposes for each load of waste disposed. The classification of waste will determine the methods for handling and disposal of the material.

The *Contractor* shall implement the following waste management measures:

- Minimise waste in accordance with a waste management hierarchy.
- Categorise waste in line with the National Waste Information Regulations.
- Segregate waste to facilitate reuse and to ensure that recyclable waste is handled in an appropriate manner.

- Appoint an approved waste services contractor, licensed to collect waste and to transport, recycle and dispose of such waste at a licensed waste disposal facility.
- Keep a 100% record of all waste generated and disposed at the waste disposal facility, to include a waste manifest system covering all waste streams.
- Should any asbestos materials be found on Site during excavations, the *Contractor* shall be responsible for the handling and transportation of this material from point of source to the disposal site in accordance with relevant legislation. A Compensation Event will be issued to the *Contractor* in such instances.

8.8 Hazardous Substances

The *Contractor* shall observe all applicable legislation, including specific requirements of the EMPr relating to the handling, storage and transportation of hazardous substances as defined in the Hazardous Substances Act (Act No. 15 of 1973), the Occupational Health and Safety Act (No. 85 of 1993), applicable SABS, SANS and international standards.

In case there is hazardous waste generated, the relevant legislative requirements should be adhered to, i.e. The agreement with the service provider to remove hazardous waste shall be made available. The Hazardous waste disposal certificate, and waste manifest shall be made available post waste disposal.

The *Contractor* shall, as a minimum, comply with the following requirements:

- Storage and use of hazardous materials shall be strictly controlled to prevent environmental contamination, in accordance also with the materials safety data sheets (MSDS's).
- Hazardous material shall be stored in a lockable area with a sealed floor.
- Storage containers shall be placed in a bunded area with impermeable surface.
- Bunded areas shall contain 110% of the total volume of the stored hazardous material.
- Storage facilities shall be regularly inspected for leaks and corrosion.
- Accidental spillage of any fuel or hazardous substances shall be cleaned up immediately using the most appropriate methodologies, equipment and material.
- The *Contractor* shall develop a spill response plan for the event of any spills of fuel, oils, solvents, paints or other hazardous materials. The plan shall describe measures to be taken to remove contaminated soils and materials from Site to achieve complete removal of contamination.
- The spills response plans shall include a procedure to distinguish between spills which can be cleaned up by the *Contractor* and those that require specialist input.
- Any spill to water has the potential to disperse quickly. Such spills shall be contained immediately using appropriate containment equipment.
- Site staff shall undergo detailed spill response training.

- No vehicles or machines shall be serviced or refuelled on Site except at designated servicing or refuelling locations.
- No oil or lubricant changes shall be made, except at designated locations or in the case of a breakdown or emergency repairs.

8.9 Noise Monitoring

The *Contractor* shall comply with SANS 10103:2008, Road Traffic Act (Act 29 of 1989), South African Bureau of Standards recommended code of practice, SABS Code 0103:1983 and the Project EMPr.

When so instructed by the *Employer*, the *Contractor* shall implement and maintain a noise monitoring procedure. Calibration certificates for metres shall be kept for record and auditing purposes.

8.10 Management of Ablution Facilities

The *Contractor* shall comply with the National Environmental Management Waste Act (Act 59 of 2008) the EMPr, and other applicable legislative requirements.

The *Contractor* shall provide sufficient ablution facilities in compliance with all relevant health and safety standards and codes. A sufficient number of toilets shall be provided to accommodate the number of personnel working in any given area.

The Contractor will ensure that there is an agreement in place with the relevant municipality for the disposal of sewage waste. The Permit by the municipality, allowing for the disposal of sewage waste shall, be made available to the Employer prior to commencing with the construction activities. All the necessary waste disposal certificates, shall be made available.

No ablution facility will be placed within the 1:100 flood line.

8.11 Dust Management

The *Contractor* shall be responsible for managing dust generated as a result of his activities. Water to be used for dust suppression shall be obtained from a source approved by the *Employer.*

8.12 Water Management

The *Contractor* shall be responsible for ensuring that adequate surface drainage measures are implemented to prevent water ponding within the *works* area. It is the *Contractor's* responsibility to ensure that adequate measures are implemented to allow for management of water throughout the duration of the *works.*

8.13 Rehabilitation

The *Contractor* shall be responsible for reinstatement and rehabilitating all disturbed areas to the satisfaction of the *Employer*. A Rehabilitation Plan shall be submitted to the *Employer* for approval prior to the commencement of such activities. The *Contractor* shall make adequate allowances for the cost of these activities.

The *Contractor* shall clear and clean the Site and working areas upon completion of the *works* and ensure that equipment is removed from the Site and working areas. An Environmental

Closure Certificate shall be compiled by the *Contractor* for sign-off by the *Employer* upon the completion of the *works*. Retention moneys will not be paid until all reinstatement, rehabilitation and clean-up of the Site have been completed, a Site Closure Inspection has been conducted and the Site Closure Certificate has been signed off by the *Employer*.

9. QUALITY ASSURANCE

9.1 General Requirements

The *Contractor* shall compile, maintain and implement a documented Quality Management System (QMS) to be used in the performance of the *works.* The *Contractor's* QMS shall conform to International Standard ISO 9001:2015 or an equivalent standard acceptable to the *Employer* and shall be subject to approval by the *Employer.*

The QMS shall include the Quality Policy as well as the strategy, methodology, resource allocation and QA and QC co-ordination activities to be implemented to ensure that the *works* meet the standards stated in these specifications.

An index of the procedures that are to be used shall be provided, as well as a schedule of the internal and external audits to be undertaken during the Contract.

The *Contractor* shall also develop and maintain a comprehensive register of all quality-related documents that will be generated throughout the Contract as part of its QMS. The register shall indicate the dates of issue and sign-off of the documents by the *Employer.*

The *Employer* will indicate which of these documents are required and are to be submitted either for information, review or acceptance by the *Employer*. Witness and hold points for inspections shall also be defined by the *Employer* and shall be included in the *Contractor's* documents.

9.2 Quality Policy

The Quality Policy is a concise document, approved by the *Contractor's* executive management that defines organisational goals and objectives with regards to quality, a commitment to meeting stated requirements and an undertaking to drive continuous improvement throughout the organisation's activities. It must be suitable for the organisation and provide a framework for establishing, communicating and monitoring performance against agreed quality objectives.

9.3 Contract Quality Plan (CQP)

The CQP shall be in narrative form, detailing the project specific QA and QC systems and controls required for the *Contractor* to complete the specific *works*. The CQP shall include, but not be limited to, the following:

- Include all quality activities relevant to the scope of the *works*, identifying all procedures, reviews, audits, controls and records used to control and verify compliance with the specified contractual requirements.
- Include a listing of all special processes (e.g. welding and non-destructive testing, cube testing, soils testing, etc.) envisaged for use, including confirmation of personnel certification as required.
- Include a list of all proposed method statements for Site based *works* activities.

- Include a description of the *Contractor's* project organization, with key positions and responsibilities identified and individuals named. The organization structure shall also indicate the resources committed to the management and coordination of QA/QC activities both within the *Contractor's* organization and that of his subcontractors and suppliers.
- Include a listing of all Quality Control Plans (QCP's), Field Inspection Checklists (FIC's) and Inspection and Test Plans (ITP's) as applicable. Witness and hold points for inspections shall be defined in conjunction with the *Employer* and shall be included in the *Contractor's* documents.
- Supplier/subcontractor plans shall be reviewed and approved by the *Contractor* prior to forwarding to the *Employer*, for his approval.
- Include a schedule of proposed quality records (Data Book Index), which will form the permanent record of conformance to requirements.
- Quality Reports are to be submitted on monthly basis - QA Function
- Contract Quality Meeting are be held on monthly basis
- Quality Awareness must be done monthly
- QC: Quality inspections and site walkdowns

9.4 Staffing

The *Contractor* shall nominate a suitably qualified and experienced quality manager and inspectors for all aspects of the *works*, including general Site activities, with a staff complement that is adequate to perform the requirements of the QMS.

The *Contractor* shall submit the CV of the *Contractor's* quality manager for the *Employer's* review and approval.

9.5 Producing of Certificates

Where the properties of materials or manufactures products are required in these specifications to comply with specifications published by a standards authority, the *Contractor* shall produce, when called upon to do so, certificates from the manufacturer confirming that the materials or products supplied comply with the relevant specifications. The cost of providing such certificates shall be borne by the *Contractor*. Where it is specified that a product complies with a SANS specification, it means that the product has been tested and evaluated in accordance with the requirements of the relevant SANS specification. Where the SANS mark is specified, a certificate shall be provided by the *Contractor* as and when required by the *Employer*.

The requirements of the Quality Control Plan (QCP) apply in respect of the *Contractor*s obligation to institute and implement a control system for monitoring the quality of the work and materials supplied. The *Contractor* shall take immediate steps to rectify any deviation from the specified requirements.

The *Employer* and/or duly authorised representatives of the *Employer* shall have unencumbered access to Site and shall also have the right to inspect and be given all details of all tests and testing procedures.

9.6 Cost of Testing

The cost of all testing undertaken by the *Contractor* as part of the *Contractor's* obligations under the Contract, including the taking of samples, reinstating where samples have been taken and all testing equipment, labour, materials and the like shall be borne by the *Contractor.*

9.7 Handover and As-Built Information

The *Contractor* shall be responsible for handover of all *works* associated with this Contract. The *Contractor* shall hand over to the *Employer* the completed *works* and make good any defects that are identified during the handover inspection. The *Contractor* shall keep a record of all changes during construction

Any deviations from the designs shall be tracked and marked (red-lined) by the *Contractor* on a drawing set held on-site. Any deviations from the design drawings shall be submitted to the *Employer* for acceptance prior to implementation.

On completion of the *works*, as-built surveys shall be provided to the *Employer*. These surveys shall also be undertaken as the *works* progress and submitted for review and acceptance by the *Employer*.

The *Contractor* shall submit two hard-copies and soft copies as outlined in the documentation Handover Specification (240-128515850). The Contractor shall submit red-lined drawings and electronic copies of the as-built drawings to the *Employer* within two weeks of completion of construction *works*, for final acceptance.

The *Contractor* shall furthermore, within two weeks of completion of construction *works,* hand over to the *Employer* comprehensive QA and QC records covering the *works*, including inspection and test reports, calibration certificates and warranties compiled by the *Contractor*, by subcontractors or provided by suppliers. The *Employer* will confirm the scope of the required records.

Retention moneys may be withheld if the surveys, as-built drawings and further documentation have not been handed over and accepted by the *Employer*.

10. PROGRAMMING AND PROGRESS REPORTING

The *Contractor* shall use Eskom approved planning tool (Oracle Primavera P6) for planning, scheduling and reporting of all works as per Reporting Data Requirement Specification. The following minimum requirements must be met:

1. Assign a Qualified and experienced Project planner to the project.
2. Develop a Level 5 Schedule. Submit P6 XER file and PDF file.
3. Add Resources: Assign required resource(s) (i.e Labor, Non-Labor and Commodity units)
4. Hold Points activities.
5. Interface activities with Others, if applicable
6. Plant and Materials provided by the *Employer*, if applicable
7. Key Dates, but not limited to:
    - Start Date
    - Procurement Start Date

- Long Lead Delivery Dates
- Site Delivery Dates
- Site Access Dates
- Drop Structures Completion Date
- Cattle Crossings Completion Date
- Head cut erosion protection & reshaping and revegetation Completion Date
- Infilling of artificial channels Completion Date
- Removal of berms Completion Date
- Removal of Agricultural scars Completion Date
- Removal of existing embankment dam walls Completion Date
- Plugging of diversion channels / redirecting flow to wetland Completion Date
- Retaining of dam wall and formalization of dam Completion Date
- Removal of alien Invasive species Completion Date
- Fixing of collapsed bridge / future access Completion Date
- Ameliorate and rehabilitate eroded areas Completion Date
- Commissioning Dates
- Completion Date

8. Minimize the use of activity constraints.
9. Conduct Schedule Integrity Test to ensure schedule quality acceptance.
10. Basis of Schedule report. Strong Narratives on the followings, but not limited to:
    - Project estimation methodology
    - Assumptions
    - Contingency Float
    - Risk and Limitations
    - Constrained Activities, if applicable
    - Assigned Calendars
    - Critical Path
    - Number of Near Critical Paths (with not more than 5 days duration)
    - Milestones
    - Client Free issue items, if applicable
11. Critical Path
12. S-Curve
13. Histogram

The *Contractor's* programme, progress reports, subsequent updates, revisions and supplementary programmes as detailed in this section are an essential part of the project control system used by the *Employer* for managing the *works* and for monitoring the progress of the *works* under the Contract. Reference shall be made to Eskom Specification No 240-83561037: Planning & Scheduling Management Reporting & Data Requirements

The *Contractor's* construction programme shall correspond with the *Employer's* objectives and make allowances for the following:

- Site establishment.
- Compilation, submission and approval by the *Employer* of required health and safety, environmental and quality control documentation as detailed in these specifications.
- Quality assurance and control requirements.

- Reasonably foreseeable constraints, assumptions and conditions which may arise in line with the overall scope as outlined in these specifications.
- *Contractor's* design submissions and approvals by *Employer*.
- All procurement and construction activities.

The following programmes shall be compiled and submitted to the *Employer* for review and approval:

- **Level 1 Master Programme:** This is a high-level summary programme defining the major activities and interfaces and is included in the monthly progress report.
- **Level 2 Project Programme**: This is a summary programme rolled up from the Level 3 programme. The structure and layout will be in accordance with the work breakdown structure (WBS) as defined in the Level 3 programme.
- **Level 3 Project Programme:** This is a detailed programme generated for tracking and control of various activities and deliverables for all phases of the project. The activities shall be coded in accordance with the WBS. Various layouts and corresponding filters may be required by the *Employer*.
- **Level 4 Project Programme :** This programme is developed and maintained for tracking and control of various activities and deliverables for all phases of the Contract and includes the day-to-day activities that are work-unit based. The Level 4 programme includes the resource requirements and utilisation per activity.

The WBS included in the *Contractor's* construction schedule shall correspond with the activities defined in these technical specifications and the drawings referenced herein.

The programmes shall include and show the logical sequencing and critical path(s), any lag together with the total float per activity. Milestone dates shall be clearly indicated. Networks shall be constructed to reflect the sequence of activities, using resource scheduling to stagger the performance of activities into the most probable sequence.

The activity durations shall be estimated in working days and shall be realistic and based on quantities and applied resources. The calendars used shall be based on normal working hours per day and working days per week as detailed in these specifications or as prescribed by the *Employer*.

The *Contractor* shall attend, participate in and make a meaningful contribution to the overall planning of the project, including engagements with Others to ensure that any potential scheduling clashes are timeously identified and mitigated.

Monitoring and review of the progress of *works* shall be as detailed in Eskom Specification No 240-83561037.

11. STANDARDIZED AND PARTICULAR SPECIFICATIONS

11.1 General

The standardized codes and specifications applicable to the *works* are listed in Appendix B. Reference shall be made to the latest revision of these specifications, including all codes of practice, regulations and standards referenced therein and further variations as detailed in the particular specifications below.

All *works* shall be performed to the specified standards or consistent with recognized, good industry norms and practices, to provide the *works* in a complete, fully functional, operable and compliant manner.

Any errors, omissions, inconsistencies or discrepancies between the documents shall be brought to the immediate attention of the *Employer* for resolution, prior to construction.

Whilst the *Contractor* assumes full responsibility for compliance of the *works* in accordance with the referenced standardized and particular specifications, it is essential that, before commencement of any *works*, there is full agreement between the *Contractor* and the *Employer* on all matters in regard to construction methods to be employed by the *Contractor.*

After construction operations have started it is possible that modifications to the construction methods originally agreed upon will be found desirable. Such modifications shall be made by agreement and in writing between the *Contractor* and the *Employer*.

11.2 Preamble to SANS 1200 and COTO Specifications

Where the SANS 1200 or COTO series of specifications are referenced in the particular specifications below, the following interpretations and meanings shall apply:

- In case of any conflict in interpretation, ambiguity or discrepancy between any SANS 1200 or COTO specification and these Technical Specifications or the Conditions of Contract, these Technical Specifications and the Conditions of Contract take precedence within the ECC Contract, without prejudice to the *Employer's* express duty to resolve any ambiguity or inconsistency in these specifications under ECC Clause 17.1.

Within SANS 1200 or the COTO specifications the following amendments and interpretations shall apply:

- Where the word or expression "Employer" is used, read "*Employer*".
- Where the word or expression "Engineer" is used, read "*Employer*". This shall include the NEC *Project Manager* or *Supervisor*, as determined by the relevant context.
- Where the word or expression "Contractor" is used, read "*Contractor*". This shall include the Site Agent, *Contractor's* Representative or Construction Manager, as determined by the relevant context.
- Where the word or expression "Schedule of Quantities" or "Pricing Schedule" is used, this is deleted in its entirety. Assessment and payment is in accordance with the Conditions of Contract, the ECC main and secondary options stated therein.

Within SANS 1200 Part A, Section 2.3: Definitions, the following shall apply:

- "Acceptable, Approved (Approval)" is interpreted as an *Employer* communication or instruction in relation to compliance of the *works*, consistent with the Conditions of Contract, as the context requires.
- "Adequate" is deleted. The *Employer* notifies the *Contractor* where the *Contractor* has not complied with the specified requirements.
- "Measurement and payment" and the further definitions are deleted. Assessment and payment are in accordance with the attached Bill of Quantities in accordance with this contract. The units of measurements of each item are as listed in the Bill of Quantities. The *Contractor* is to incorporate in his rate the production rate of working by manual labour. The *Contractor* is not prohibited to incorporate production rate of machine usage in this contract.
- Within SANS 1200 Part A, Section 2.6: Approval, the following applies:
- "Approval" by the *Employer* is without prejudice to ECC Clause 14.1 and, inter alia, ECC Clauses 13.1, 14.3 and 27.1.

Within SANS 1200, Section 4: Plant, the following applies:

- Where the word or expression "Plant" is used, read "Equipment".

The number of the relevant clauses and payment items in the further particular specifications consists of the prefix PS, followed by a number corresponding to the number of the relevant clause or payment item in the standard specifications, as and where applicable. The new numbers follow on the last clause or item number used in the relevant section of the standardized specifications.

11.3 General Precautionary Measures

The *Contractor* shall check all project dimensions, levels and setting out data on Site beforehand. Any discrepancies shall immediately be reported to the *Employer*. No scaling-off of drawings shall be done.

The *Contractor* shall confirm all invert levels of connection points to existing services on Site beforehand. Any discrepancies shall immediately be reported to the *Employer*.

Where new construction ties into existing structures, the *Contractor* shall cross check and confirm all critical dimensions and levels related to the existing structures, before any construction or manufacturing commences.

Products or construction methods different to those specified in any project document or drawing may only be used with written approval from the *Employer*. Such approval shall be requested in writing by the *Contractor*.

It remains the responsibility of the *Contractor* to compare drawings of the various engineering disciplines and notify the relevant parties/disciplines of any discrepancies immediately in writing.

Where conflicting requirements between the drawings, these technical specifications and items included in the pricing schedules occur, the drawings and technical specifications will take preference over the pricing schedules. The *Contractor* shall immediately inform the *Employer* in writing of any such occurrence.

12. PARTICULAR SPECIFICATIONS

12.1 PSA: GENERAL

12.1.1 PSA-2: Interpretations

PSA-2.1: Application

Delete this clause and replace as follows:

"The standardized specifications contain clauses that are generally applicable to civil engineering construction. Interpretations of and variations to these specifications are set out in these Particular Specifications."

12.1.2 PSA-3: Materials

PSA-3.1: Quality

Add the following:

"The onus rests on the *Contractor* to produce *works* which conform in quality and accuracy of detail to the requirements of the drawings and specifications. The *Contractor* shall, at the *Contractor's* own expense, institute a quality control system and provide experienced technical staff together with all transport, instruments and equipment to ensure adequate supervision and control of the *works* at all times, as detailed also under Section 9 above. The *Contractor* shall keep the *Employer* fully informed on all aspects of the quality control system.

Alternate materials proposed by the *Contractor* shall require the approval of the *Employer* prior to being used as part of the *works.* Further test results may be required prior to the acceptance of such materials by the *Employer*. The costs of these tests shall be borne by the *Contractor*.

Where specified or directed by the *Employer*, the *Contractor* shall submit to the *Employer* samples of the materials that are to be used, for the approval of the *Employer,* prior to their incorporation in the *works*. Samples may also be required to serve as standards to be applied to construction methods, (e.g. surface finishes) for the duration of the contract. The costs of all tests and samples shall be borne by the *Contractor*.

No crushed rubble or crushed concrete materials shall be used in the earthworks or layerworks.

It is the *Contractor*'s responsibility to confirm that all necessary materials are available to successfully complete the *works* within the contract period. No claims based on the non-availability of materials will be considered.

The *Contractor* shall inform the *Employer* of any testing to be done at least 24 hours before such tests are required and must allow in the *Contractor's* program for the time necessary for the tests and the processing of the test results."

12.1.3 PSA-4: Plant

PSA-4.2: *Contractor's* Office, Stores and Services

Replace the third paragraph with the following:

"Upon completion of the *works,* and with the written consent of the *Employer*, the Site establishment shall be removed. The whole area of the Site establishment, temporary access roads and other working areas, shall be cleared and appropriately re-vegetated where necessary."

Add the following:

" The *Contractor* shall establish a camp site at the designated area indicated under Part C4 - Site Information.

The *Contractor* shall ensure that the area is properly fenced and secured at all times and provide all access control. The area may only be used for offices, stores, repair shops and other activities required for the *works*. Accommodation of the *Contractor*'s staff at the campsite, apart from security personnel, will not be permitted. The *Contractor* shall make his own arrangements to house his employees and transport them to Site.

Adequate chemical ablution facilities shall be provided and maintained on Site.

The camp site shall be rehabilitated to its original standard prior to handing back to the *Employer*."

12.1.4 PSA-5: Construction

PSA 5.1.1 Setting Out of the *works*:

Add the following:

"The *Employer* will provide benchmarks for the setting out of the *works*, located within the precinct of the existing Kusile Power Station.

Setting out of the *works* is the sole responsibility of the *Contractor*. The *Contractor* shall, within two (2) weeks after the Site has been handed over to him, or drawings issued for construction, verify the correctness of all setting out points. Any discrepancy shall immediately be reported to the *Employer*.

PSA-5.2: Watching, Barricading, Lighting and Traffic Crossings

Add the following:

No *works* may proceed in any section where accommodation of traffic is required until such time as the relevant requirements with regard to signposting are met.

The *Contractor* shall keep sufficient surplus signs, barricades and delineators on Site to allow for the replacement of damaged or missing items within a period of three hours of instructions having been given by the *Employer*."

PSA 5.5: Dealing with Water on the *Works*

Add the following:

"All water, whether from rain, floods, pipeline failures, or subsurface water and infiltration shall be dealt with in such a way as to ensure the safety of the *works*.

Adequate preventive measures shall be taken to ensure that the *works* are protected from damage due to flooding. Should these measures fail to protect the *works*, additional steps shall immediately be taken by the *Contractor* to protect the *works* and prevent further damage to adjoining properties.

The *Contractor* shall design, construct and maintain all drains and other temporary *works* necessary for the dewatering and flood protection of the permanent *works*. All methods of dewatering and flood protection shall be to the approval of the *Employer*.

Having served their purpose, all temporary *works* shall be removed, backfilled or levelled such that the operation of the *works* shall not be affected in any way.

The *Contractor* shall be responsible for and shall repair at the *Contractor's* expense any damage to the foundations, structures or any part of the *works* caused by floods, water or failure of any part of the dewatering and flood protection *works*, and the *Contractor* shall ensure that the situation is monitored during weekends and holidays.

The *Contractor*'s attention is drawn to the fact that, during the rainy season, high water tables may be encountered on Site. Pipelines, other below-ground installations and structures may become buoyant due to the inflow of stormwater or groundwater. Measures shall be taken to mitigate any attendant risks to the *works.*

The *Contractor* shall ensure that silt prevention actions shall be used at intervention locations (hay bales or similar) to prevent excessive silt from excavation operations from entering the natural water course.

The cost of these protection *works*, including rectification of damages, shall be borne by the *Contractor*. *"*

Clause 5.6: Pollution

Add the following:

"The *Contractor* shall ensure that all construction debris (e.g. cement bags, timber, wire, nails, etc.) waste and surplus food, food packaging, litter, organic waste and the like are properly collected and disposed of at a registered waste disposal site approved by the *Employer*. Waste bins shall be provided on Site as necessary, to collect such debris prior to disposal."

PSA-5.8: Ground and Access to *Works*

Add the following:

"Upon completion of the *works*, the *Contractor* shall remove from Site all temporary facilities and infrastructure used during the performance of construction activities and restore the existing ground surface, including roads and tracks outside of the new construction footprint that were disturbed during construction activities undertaken by the *Contractor.*

Where existing road surfaces have been damaged by the *Contractor*, the *Contractor* shall re-surface the roads to at least their original state prior to construction, including all applicable layerworks.

Excess materials shall be removed, and all temporary excavations shall be filled with material similar to the adjoining natural ground. Walls, fences, hedges and access to other properties damaged by the *Contractor* shall also be replaced and/or repaired.

The cost of these restoration *works* shall be borne by the *Contractor*."

12.1.5 PSA-7: Testing

PSA-7.2: Approved Laboratories

Add the following:

"All quality control tests conducted on Site, as detailed in these Technical Specifications, shall be performed by a SANAS accredited laboratory"

12.1.6 PSA-8 : Measurement and Payment

Delete this section.

12.2 PSC: SITE CLEARANCE

12.2.1 PSC-3: Materials

PSC-3.1 Disposal of Materials:

Add the following:

"a) The *Contractor* shall be responsible for the proper disposal of waste (rubble, non-composite rubbish, contaminated soil, surplus material, etc.) in accordance with the Environmental Conservation Act of 1982. This shall include the disposal of any high risk substances as defined in the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) under GAR Annexure 4, and in particular the disposal of asbestos in accordance with AR R17 of that Act.

b) The *Contractor* shall dispose of all tree stumps, rubble, non-composite rubbish and surplus material. The disposal of material by burning of combustible material is prohibited.

c) The *Contractor* shall dispose of clean, granular materials, including hard rock excavations and unsuitable, oversized materials (calcrete, cobbles and/or boulders) at the designated spoil site as indicated in Part C.4 : Site Information.

d) Where possible, excavated materials will be re-used for backfilling. All other spoil materials shall be taken to a registered waste disposal site, to be approved by the *Employer*."

12.2.2 PSC-8: Measurement and Payment

Delete this section.

12.3 PSD: EARTHWORKS

12.3.1 PSD-1: Scope

Add the following:

"This specification covers construction of bulk earthworks for the following:

- Wetland interventions – in accordance with SANS 1200 D

12.3.2 PSD-3: Materials

PSD-3.1: Classification for Excavation Purposes

Delete this clause and replace as follows:

"The *Contractor* may use any method the *Contractor* chooses to excavate any class of material, but the *Contractor's* chosen method of excavation shall not determine the classification of the excavation. The classification shall be based on a joint inspection by the *Contractor* and *Employer* of the material to be excavated and on the criteria given in subclause PSD 3.1.2. In the event of any dispute the relevant provisions included in the ECC shall apply. All equipment shall be in good mechanical condition."

PSD-3.1.2: Classes of Excavation

Delete subclauses a) and b) and replace as follows:

"a) Soft excavations

Soft excavations shall include all materials, except materials that can only be loosened by blasting. No distinction shall be made between soft and intermediate excavations.

b) Hard excavation

Hard excavation shall be materials that can only be loosened by means of blasting."

PSD-3.3: Selection

Delete Clause 3.3.1: General. Replace the first paragraph with Clause PSD-5.2.1.2 below. Delete and replace the second paragraph as follows:

"The *Contractor* shall bear full responsibility for the identification and selection of suitable materials within the Site for construction of the *works.* All excess or unsuitable materials shall be disposed of at the designated spoil site as described under Section C.4: Site Information."

12.3.3 PSD-4: Plant

PSD-4.1: General

Delete this clause and replace as follows:

"Plant shall be suitable for the production of the end result required under the conditions applicable to the Site."

12.3.4 PSD-5: Construction

PSD-5.1.2: Detection of Existing Services

Delete Clause 5.1.2.2 and replace as follows:

"PSD-5.1.2.2: Detection, Location and Exposure

Prior to any excavation by machine, the *Contractor* shall make every effort to obtain all relevant drawings, indicating the position of potential existing services, via the *Employer.* Where any live, existing services are anticipated, the *Contractor* shall undertake the following:

- Trial pits and proving trenches shall be excavated by hand to a depth of approximately 1.2 m, but no less than 1.0 m.
- The *Contractor* shall procure non-intrusive detection equipment, e.g. cable locator and/or ground-penetration radar and undertake a sweep at and around the working area.

Care shall be taken by the *Contractor* to properly demarcate and protect all existing services, unless they are confirmed to be abandoned or will be replaced as part of this project.

If any existing service is damaged that should have been located or protected by the *Contractor*, the *Contractor* shall carry the cost of the repair of that service.

Should any service be damaged by the *Contractor,* it is the responsibility of the *Contractor* to report such damage to the *Employer* immediately.

Where the *Contractor* encounters existing underground services, including cables or service ducts, the *Contractor* shall undertake the following:

- Notify the *Employer* of the located service as soon as possible.
- Notify the relevant utility owners or officials as soon as possible.
- Ascertain whether the service is still required and must remain live, or whether the service has been abandoned.
- If the service is confirmed as abandoned, and upon agreement with the *Employer*, the *Contractor* will be allowed to remove such service.
- If the service is deemed live, it shall be demarcated and protected by the *Contractor* and marked on the specific record drawing for that area or service discipline."

PSD-5.2.1.2: Conservation of Topsoil

Delete this clause and replace as follows:

"a) Drop Structures, Cattle Crossings and other Interventions

Topsoil shall be removed to a depth of 150mm, or the depth shown on the drawings along the full length and footprint of the intervention and placed in a temporary windrow nearby, for re-use. The topsoil shall not be contaminated with other excavated material.

Upon completion of the intervention, the previously conserved topsoil shall be evenly spread around the interventions where disturbance has occurred, and the area shall be treated with hydroseeding as detailed in these specifications.

PSD-5.2.2.1: Excavations for General Earthworks and Structures

Add the following:

"f) Drop Structures, Cattle Crossings and other Interventions

Bulk excavations for interventions shall be done using appropriate excavation equipment. Batter boards shall then be erected at 10 m intervals and final trimming, including removal of oversize materials (in excess of 150 mm diameter) shall be done by hand to the tolerances as specified under Section PSD-6.1 below.

The base and banks of the areas to be rehabilitated shall be lightly watered and compacted using hand-held equipment (plate compactors or the like) prior to re-spreading of topsoil, hydroseeding and placement of biodegradable erosion blanket, as described under PSD-5.2.4.3 and PSD-5.2.4.6 below."

PSD-5.2.2.2: Borrow Pits

Delete and replace as follows:

"There are no authorised borrow pits within the Site. The *Contractor* shall obtain suitable materials from excavations conducted as part of the *works* or for from duly certified and authorised borrow pits or commercial sources outside of the Site, to be identified by the *Contractor* and approved by the *Employer.*"

PSD-5.2.2.3: Disposal

Add the following:

"All excess excavated or unsuitable materials shall be taken to the designated spoil site, as detailed in Section C.4 : Site Information. The stockpiled materials shall be placed to a height not exceeding 18.0 m. This maximum height is subject to environmental authorisations. Upon completion of spoiling of the excavated materials at the stockpile, the top and embankments of the stockpile shall be neatly shaped with slope batters no steeper than 1(V) : 2 (H)."

PSD-5.2.3.1: Embankments

Delete this clause.

Add the following new clauses:

"PSD-5.2.3.3: Construction of Interventions

"Interventions shall be constructed to the lines and levels as shown on the drawings or as directed by the *Employer* .

Material shall be obtained and selected from the intervention excavations. Only material that is free of vegetation, stumps, trees, rubbish and other deleterious materials, and that has been approved by the *Employer* shall be used in the construction of basal founding layers. The maximum size of stones or rocks shall not exceed 150 mm.

All topsoil within the footprint of the berms shall be removed to a depth of 150 mm and placed in a windrow adjacent to the *works* area, for later re-use.

The base of the interventions shall be watered and compacted to 90% Mod AASHTO density. The founding layerworks shall be constructed in layers not exceeding 150 mm and shall be compacted to 93% Mod AASHTO density. Final trimming shall be undertaken by hand, to the lines and levels shown on the drawings and to within the tolerances as specified under Clause PSD 6.1 prior to topsoiling and hydroseeding."

PSD-5.2.4.2: Topsoiling

Change the final thickness of topsoil to 150 mm.

PSD-5.2.4.3: Grass or other Vegetation

Add the following:

"The following mixture shall be used for hydroseeding of the finished channel base and banks as well as the stockpile of spoil materials at the designated spoil site :

i.	Cynodon dactylon	10 kg/ha
ii.	Eragrostis curvula	5 kg/ha
iii.	Chloris gayana	8 kg/ha
iv.	Digitaria erianthus	8 kg/ha
v.	Eragrostis teff	3 kg/ha
vi.	Total seed	34 kg/ha
vii.	Fertilizer : 2.3.4(30)zn	400 kg/ha
viii.	Urea	150 kg/ha
ix.	Hydropam soil stabilizer	15kg/ha

Prior to application of the hydroseed mix the *Contractor* shall manually cut small furrows horizontally along the embankment at 300mm centres. The topsoil soil shall be loose and moist before any hydroseeding commences.

The specified seed mix and fertiliser as detailed above shall be applied using an approved hydroseeding machine in such a manner as to ensure even distribution of seed and fertiliser throughout. The seedbed shall be kept moist after hydroseeding until good germination is achieved."

Add the following new clauses:

"PSD-5.2.4.6 Biodegradable Erosion Blanket

Where shown on the drawings or so instructed by the *Employer*, the *Contractor* shall procure and place a biodegradable erosion control blanket along the base and embankments of the channels in accordance with the drawings and the guidelines provided by the supplier. The erosion control blanket shall be placed after hydroseeding has been completed. The following minimum requirements shall apply.

The *Contractor* shall provide to the *Employer* a sample of the erosion control blanket to be used as well as further technical specifications and guidelines as provided by

the supplier, for review and approval by the *Employer* prior to placement of orders and installation of the blanket.

The erosion blanket shall be secured along the full length and to either side of the channel within a trench measuring 400mm wide by 400mm deep, to act as an anchor for the blanket. Reference is also made to the drawings.

After securing of one side of the blanket at the top of the embankment, the blanket shall be rolled out over the full width of the channel and secured along the embankment and base of the channels using anchoring staples, placed at a spacing of no more than 1.0 m in both directions. Staples shall comprise of U-shaped R6 mild steel bars with a length of no less than 200 mm and shall be driven in to be flush with the channel surface.

Overlaps between adjoining rolls of the blanket shall be no less than 100 mm. Two rows of staples shall be provided along the full length of overlaps, placed at a spacing of no more than 100 mm.

After placement of the blanket over the full width of the channel, the free end of the blanket shall also be secured within a backfilled and compacted trench, as shown on the drawings."

PSD-5.2.5 Transport of Earthworks

Delete Clause 5.2.5.1 : Freehaul and Clause 5.2.5.2 : Overhaul.

12.3.5 PSD-6: Tolerances

PSD-6.1 : Position, Dimensions, Levels etc.

Delete this clause and replace as follows:

"The permissible deviations from the lines and levels as shown on the drawings shall be as follows shown in Table 22 below.

Table 4 : Tolerances

Removal of Dam Embankments and Filling of Agricultural Scars	
Permissible deviation between finished and specified levels, as shown on drawings, along top and edge of completed engineered fill	± 100 mm
Permissible deviation between finished and specified X-Y Co-ordinates, as shown on drawings, along top and edge of completed engineered fill	± 200 mm
Permissible deviation between finished and specified fill and cut slopes, as shown on drawings, along top and edge of completed engineered fill	± 0.3 %
Head-Cut Erosion Rehabilitation	
Permissible deviation between finished and specified levels, as shown on drawings, along top and edge of completed engineered fill	± 50 mm
Permissible deviation between finished and specified X-Y Co-ordinates, as shown on drawings, along breakpoints between base and embankments and along embankment and top of channel after topsoiling	± 200 mm

Spillways, Drop Structures and Cattle Crossings	
Permissible deviation between finished and specified levels, as shown on drawings, along top and edge of completed engineered fill	± 30 mm
Permissible deviation between finished and specified X-Y Co-ordinates, as shown on drawings, along breakpoints between base and embankments and along embankment and top of channel	± 100 mm

Notes : Ensure that elevations and positions as recorded by the surveyor and included in the record drawings comply with the lines, grades, elevations, and tolerances as indicated drawings and specifications.

12.3.6 PSD-8: Measurement and Payment

Delete this section.

Table 5 : Testing Frequencies

Test	Specification	Interventions Basal Layerworks and Backfill
Visual Soil Classification	ASTM D2488	Continual during excavation and placement of soils
Maximum Dry Density and Optimum Moisture Content	SANS 3001-GR30	Minimum 1 test per 5 000 m^3 of placed fill (1)
Sieve Analysis	SANS 3001-AG1	Minimum 1 test per 1 500 m^3 of placed fill (1)
Atterberg Limits	SANS 3001-GR10	Minimum 1 test per 1 500 m^3 of placed fill (1)
In Situ Density using a Nuclear Density Gauge	SANS 3001-NG5	Minimum 1 test per 500 m^3 or one test per day's production
Determination of Moisture Content by Oven-Drying	SANS 3001-GR20	1 per 20 nuclear moisture tests
Sand Replacement Cone Test	SANS 3001–GR35	1 per 20 nuclear density test
Laboratory Hydraulic Conductivity on Field Collected Sample 2,3,4	ASTM D5084	n/a

Notes:

1. If this includes more than one material type, separate tests shall be conducted for each type of material.
2. Tests shall be performed on an approximately even grid to provide adequate testing coverage.
3. Samples shall be collected and transported to the laboratory using the same procedures as used for the test pad (i.e., Shelby tubes or block samples).
4. Laboratory samples to be tested at confining pressures of 15 psi (104 KPa).

12.4 PSDK: GABIONS

12.4.1 PSDK-1: Scope

This specification covers the construction of gabions and reno mattresses to form channel linings, stilling basins and the like.

12.4.2 PSDK-3: Materials

Delete Clause 3.1.2 and replace as follows:

"3.1.2 Gabion and Reno Cages

Reno-Mattresses: The size of the reno-mattresses will be as detailed in the design drawings. The mattresses shall be manufactured to SABS1580 specifications with aperture size 60mm(w) x 80mm(l). The wire shall be polyvinyl-chloride (PVC) coated in a green colour (or other approved). Mesh diameter shall be a minimum of 2.2mm (excluding PVC coating).

Gabion Baskets: The size of gabion baskets used shall be as detailed in the design drawings. The gabion baskets shall be manufactured to SABS1580 specifications with aperture size 80mm(w) x 100mm(l). The wire shall be polyvinyl-chloride (PVC) coated in a green colour (or other approved). Mesh diameter shall be a minimum of 2.7mm (excluding PVC coating)."

Delete Clause 3.1.3 and replace as follows:

"3.1.3 Geotextile

The geotextile shall be nonwoven, continuous filament, needle punched, polypropylene/polyester with a nominal weight of 340g/m^2 and manufactured in accordance with GRI-GT 13a. Further properties shall be as indicated in Table 24 below.

Table 6 : Geotextile Properties for Gabions and Reno Mattresses

Property	Test Method SANS / ASTM	Unit	Value
Tensile Strength – 200mm wide strip (weaker direction)	SANS 1525:13	kN/m	25
Trapezoidal Tear Strength (weaker direction)	ASTM D4533	N	650
CBR Puncture Strength	SANS 12236:13	kN	4.3
Permeability @ 50mm head	SANS 11058:13	m/s x 10^{-3}	4.34

Notes: All values are Minimum Average Roll Value (MARV) unless otherwise indicated.
Evaluation to be on 50 mm strip tensile specimens after 500 hours exposure unless otherwise indicated.

Add the following to Clause 3.2.1:

"Reno-mattresses: The stone size required to pack the reno-mattresses will be >100mm, <120mm.

Gabion Basket: The stone size required to pack the gabion baskets will be >120mm,<250mm."

12.4.3 PSDK- 6: Tolerances

Degree of Accuracy will be Level I.

12.4.4 PSDK-8: Measurement and Payment

Delete this section.

12.5 PSDM: EARTHWORKS (ROADS, SUBGRADE)

12.5.1 PSDM-3.2: Interpretations

Add the following to Subclause 2.1:

"TRH14: Guidelines for Road Construction Materials"

12.5.2 PSDM-3 : Materials

PSDM-3.1: Classification for Excavation Purposes

Delete this clause and replace as follows:

All cut to fill, cut to spoil, borrow to fill and excavations for drains shall be classified as set out in Subclause PSD-3.1.2.

PSDM-3.2: Classification for Placement Purposes

Delete sub-clauses 3.2.1 to 3.2.3 and replace as follows:

"i. The quality of fill materials shall be as shown on the drawings, classified in accordance with TRH14 and summarised in Table 25 below:

Table 7 : Properties of Fill Materials

Property	TRH14 Classification	
	G9	G10
CBR (%) @ Maximum Dry Density	Minimum 7	Minimum 3
Swell (%) @ Maximum Dry Density	1.5%	
Maximum Particle Size	Material to be broken down to ensure maximum particle size of 150 mm	

ii. Selected layers shall be as defined in Tables 3A and 3B of SANS1200-M."

12.5.3 PSDM-5: Construction

PSDM-5.2.2.3: Use of Material

Delete and replace Subclause b): Cut to Spoil as follows:

"All excess excavated or unsuitable materials shall be taken to the designated spoil site, as detailed in Section C.4: Site Information. The stockpiled materials shall be placed to a height not exceeding 18.0 m. This maximum height is subject to environmental authorisations. Upon completion of spoiling of the excavated materials at the stockpile, the top and embankments of the stockpile shall be neatly shaped with slope batters no steeper than 1(V): 2 (H)."

Delete the last paragraph of Subclause c): Cut to fill, starting with "Topsoil shall be stockpiled and preserved …" and replace as follows:

"Topsoil shall be removed to a depth of 150 mm or the depth shown on the drawings along the full footprint of the roads. Sufficient topsoil shall be placed in a temporary windrow for respreading along exposed cut and fill batters and along unlined drains, Excess topsoil shall be taken to the designated topsoil stockpile as detailed in Part C.4: Site Information.

The stockpiled topsoil shall not be contaminated with other excavated material. The topsoil stockpile shall have a maximum height of 18.0 m with batter slopes no steeper than 1 (V): 2 (H)." This maximum height is subject to environmental authorisations.

PSDM-5.2.4.3: Finishing

Change depth of topsoiling in Subclause e) to 150 mm.

Replace Subclause f) as follows:

"f) Grassing

All exposed cut and fill slopes, including unlined road drains, shall be hydroseeded as described in Clause PSD-5.2.4.3."

PSDM-5.2.5: Selected Layer

Delete this clause and replace as follows:

"The degree of compaction of selected layers shall be as shown on the drawings. Cohesionless sand shall not be used for the selected layers."

12.5.4 PSDM-8: Measurement and Payment

Delete this section.

12.6 PSXD: MANUFACTURE, SUPPLY, INSTALLATION AND TESTING OF GEOTEXTILES

12.6.1 PSXD-1: Scope

This specification covers non-woven needle punched polyester or polyprop geotextile test properties (Type A) for use as protection or cushioning materials and cuspated liners. Typical use will be as a protective covering or underlayment of a geomembrane against

puncture or tear due to rock, stones, concrete or other hard surfaces and/or objects. The standards referenced in this specification are listed below.

Table 8 : Referenced Specifications for Geotextiles

Reference	Title
ASTM D 4354	Practice for Sampling of Geosynthetics for Testing
ASTM D 4355	Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
ASTM D 4439	Terminology for Geotextiles
ASTM D 4491	Test Methods for Water Permeability of Geotextiles by Permittivity
ASTM D 4533	Test Method for Index Trapezoid Tearing Strength of Geotextiles
ASTM D 4595	Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method
ASTM D 4632	Test Method for Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	Test Method for Determining Apparent Opening Size of a Geotextile
ASTM D 4759	Practice for Determining the Specification Conformance of Geosynthetics
ASTM D 4833	Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4873	Guide for Identification, Storage, and Handling of Geotextiles
ASTM D 5261	Test Method for Measuring Mass per Unit Area of Geotextiles
ASTM D 6241	Test Method for Static Puncture Strength of Geotextiles and Geotextile Related Product Using a 50-mm Probe
AASHTO M288-96	Geotextile Specification for Highway Applications
GRI-GT12	Specification for Test Methods and Properties for Nonwoven Geotextiles Used as Protection (or Cushioning) Materials
GRI-GT 13(a)	Test Methods and Properties for Geotextiles Used as Separation between Subgrade Soil and Aggregate
GRI-GT 12(b)	Test Methods and Properties for Nonwoven Geotextiles Used as Protection (or Cushioning) Materials

12.6.2 PSXD-2: Definitions

For the purposes of this specification, the following definitions shall apply:

- **“Geotextile”** is a permeable geosynthetic comprised solely of textiles.
- **"Minimum Average Roll Value (MARV)"** is the property value calculated as Typical Roll Value minus two standard deviations. Statistically, it yields a 97.7 percent

degree of confidence that any sample taken during quality assurance testing will exceed the Minimum Average Roll Value.

12.6.3 PSXD-3: Materials

PSXD-3.1 : Material Specification : Geotextile used for Separation Purposes

The geotextile used for separation purposes shall comprise of non-woven needle punched polyester or polypropylene, meeting the requirements for a Class 2 geotextile, as defined in the AASHTO Standards: M288-96 - Geotextile Specification for Highway Applications.

The geotextile must fail at elongation (strains) greater than 50% and shall be stable at temperature of 100°C. The material specifications as shown in Table 50 shall apply.

Table 9 : Material Properties : Geotextile used for Separation Purposes

Property	Test Methods	Units	Requirements
Grab strength	ASTM D 4632	N	700
Sewn seam strength	ASTM D 4632	N	630
Tear strength	ASTM D 4533	N	250
Puncture strength(1)	ASTM D 4833	N	250
Permittivity	ASTM D 4491	Sec^{-1}	0.02(2)
Apparent opening size	ASTM D 4751	mm	0.60 max avg. roll value
Ultraviolet stability	ASTM D 4355	%	50% after 500 hr of exposure

Notes:

(1) Where ASTM D6241 is used, the puncture strength in orders of magnitude greater than 5 times will be accepted.

(2) Default value, if value not achieved, the permittivity of the geotextile shall be greater than that of the soil or the permeability of the geotextile shall be greater than that of the soil.

12.6.4 PSXD-5: Construction

PSXD-5.1: Delivery, Storage and Handling

Geotextiles labelling, shipment, and storage shall be in accordance with ASTM D 4873.

The geotextile delivered to Site shall bear clear markings showing the manufacturer or supplier name, product name, unit mass and unique number per roll.

The roll shall be covered with an opaque plastic sheet to protect the geotextile from damage due to shipment, water, sunlight, and contaminants. If the geotextile roll is exposed to sunlight, at the discretion of the *Employer*, the outer layers of the roll shall be cut off and discarded.

.During storage, geotextile rolls shall be stored on a secure dry, free draining surface that is elevated off the ground and adequately covered to protect them from any

construction damage, precipitation, extended ultraviolet radiation including sunlight, chemicals that are strong acids or strong bases, flames including welding sparks, excess temperatures, and any other environmental conditions that may damage the physical property values of the geotextile

PSXD-5.2: Surface Preparation

The *Contractor* shall prepare the surface, in advance of placing the geotextile, to achieve a smooth, even surface, clear of any aggregates or debris, and constructed to the cross section and profile indicated on the plans.

PSXD-5.3: Installation

The geotextile shall be placed loosely with no wrinkles or folds, and with no void spaces between the geotextile and the ground surface.

Successive sheets (placed alongside one another or end-on-end) of geotextiles shall be overlapped a minimum of 300 mm, with the upstream sheet overlapping the downstream sheet. The overlaps shall be in such a direction that cover soil, when placed on the geotextile, is not pushed into the joint under the top layer.

Should the geotextile be damaged during installation or drainage aggregate placement, a geotextile patch shall be placed over the damaged area extending beyond the damaged area a distance of 300 mm, or the specified seam overlap, whichever is greater.

Where the geotextile is being placed in the sub-grade layer, it may be deployed by machine. However, all wheel tracks shall be removed prior to the geotextile being deployed onto an area.

Where the geotextile is being placed onto the geomembrane, it shall be deployed by hand so as not to damage the geomembrane in any way. Particular care shall be taken to prevent damage of the geomembrane.

The geotextile shall be held in place with sandbags to prevent wind uplift. Should the geotextile be displaced by wind or any other force, the *Employer* or CQ Monitor shall inspect the geotextile for damage and determine if the damaged geotextile is to be removed and replaced.

The use of construction machinery directly over the geotextile is strictly prohibited. A minimum of 250 mm of cover shall be kept between heavy equipment and the geotextile at all times. No heavy vehicles may be driven directly over the geotextile until the proper thickness of cover had been placed.

12.6.5 PSXD-7: Testing

The manufacturer shall be responsible for establishing and maintaining a quality control programme to assure compliance with the requirements of the specification. Documentation describing the quality control program shall be made available upon request.

The *Contractor* shall provide to the *Employer* a certificate stating the name of the manufacturer, product name, chemical composition of the filaments or yarns and other pertinent information to fully describe the geotextile. The certification shall state that the furnished geotextile meets MARV requirements of the specification as evaluated under the manufacturer's quality control program.

12.7 PSXE-1: GEOTEXTILE: SEPARATION

12.7.1 PSXE-1: Scope

This specificover the geotextile components required for the separation layer above the renomattress base and beneath the concrete finishing layer.

12.7.2 PSXE-2: Material Properties and Conformance Testing

PSXE-2.1 : Geotrextile for Filtration and Separation Layers

The geotextile used for the filtration and separation layers shall be a non-woven needle punched polypropylene or polyester geofabric with a nominal minimum mass of 200g/m^2 and shall have the properties listed in Table 52 below.

Table 10 : Properties of 200g/m^2 Geotextile

Property	Test Method SANS / ASTM	Unit	Value
Thickness (at 2kPa)	SANS 9863:13	mm	0.8
Tensile Strength – 200mm wide strip (weaker direction)	SANS 1525:13	kN/m	11
CBR Puncture Strength	SANS 12236:13	kN	2
Puncture Resistance Diameter of hole (max)	SANS 13433:13	mm	23

Notes:

i. All values are Minimum Average Roll Value (MARV) unless otherwise indicated.
ii. Evaluation to be on 50 mm strip tensile specimens after 500 hours exposure unless otherwise indicated.
iii. Where products are tested under other test methods, the methods and results shall accompany the tender. The geotextile must be stable in the presence of chemicals typically found in a landfill and shall be resistant to attack from these chemicals.
iv. All geotextiles shall be stable at a temperature of 100 °C

12.7.3 PSXE-4: Plant

The *Contractor* shall provide plant specific to the geotextiles and geosynthetics used to prevent damage and/or reduction of the geotextiles and geosynthetics properties specified.

Due to the nature of the geosynthetics, “Bobcat” compact track like plant will need to be used to prevent damage of the geosynthetics during the installation thereof and the construction and installation of the layers above. The *Contractor* is to ensure that the plant utilized for the spreading of aggregate is not to exceed 5 tonnes operating weight and is to be track mount plant. The proposed plant is to be submitted to the *Employer* prior to placement of aggregate for written approval.

12.7.4 PSXE-5: Construction

PSXE-5.1: Handling and Placement

The installer's personnel shall handle the geotextiles in such a manner as to minimize damage and shall comply with the following:

A copy of the manufacturer's installation guidelines must be supplied to the CQA Officer and *Employer* with the geotextile.

The geotextile shall be delivered to site in rolls covered with an opaque plastic sheet to prevent damage from sunlight and shall be stored as per the supplier's specification.

Panel Placement forms must be submitted to the *Employer* and approved before commencement of the installation.

The method of installation shall ensure that the geotextile is in continuous contact with the surface subgrade. The geotextile shall not be stretched or bridged over hollows or humps.

No horizontal joints shall be allowed on any slope during installation of the geotextile.

The geotextile shall be held in place with sandbags to prevent wind uplift. Sandbags shall be installed during the placement and shall remain until replaced with the overlying layer/s. Sandbags shall be filled with fine grained material and must be handled with care to prevent rupture.

Geotextiles shall be kept continually under tension to minimize to presence of wrinkles in the geotextile.

Where the geotextile is being placed onto the geomembrane and underlying geosynthetics, it shall be deployed by hand so as not to damage the geomembrane and geosynthetics in any way. Special care shall be taken by the Installer to prevent damage of the geomembrane and underlying geosynthetics.

Geotextiles shall be cut using an approved geotextile cutter only (i.e., upward cutting hook blade).

After installation, the entire surface of the geotextile shall be examined, and harmful foreign objects, shall be removed.

A minimum thickness of 300mm of cover shall be kept between heavy equipment and the geotextile at all times.

No construction traffic shall be allowed directly on any of the laid geotextile.

All laid and approved geotextile is to be covered within fifteen (15) days to prevent damage due to UV exposure.

PSXE-5.2: Seams and Overlap

Overlap widths are site specific and generally at the discretion of the CQA Engineer.

On side slopes, the geotextile shall be securely anchored in the anchor trench, then unroll to prevent wrinkles and folds. End of roll overlaps shall be lapped upslope over down slope, and the overlap shall be a minimum of 300mm. Adjacent end of roll overlaps (down slope) shall be offset by a minimum of 200mm.

All rolls (placed alongside one another or end-on-end) shall overlap by a minimum of 300mm or be sewn with a polyester thread or shall be heat bonded along overlapping edges, or all three methods, as per the supplier's specification.

For curves, the geotextile shall be folded or cut and overlapped in the direction of the turn (previous geotextile on top).

PSXE-5.3: Repairs

Holes in the geotextile shall be patched with geotextile of the same unit weight and material.

Sufficient overlap shall be provided to ensure that a suitable thermal seam can be produced, that will not come apart and, when used as a filter, will contain soil.

Patches shall be placed over the damaged area and extend 200mm beyond the perimeter of the damaged area and be thermally bonded.

Care shall be taken to remove any soil or other material which may have penetrated the torn geotextile.

The *Contractor* shall submit a summary of the manufacturer's qualifications and a copy of the manufacturer's quality control manual together with the Tender Document. The geotextile manufacturer shall provide a qualified and experienced representative to be available on an as needed basis during construction. The representative shall visit the site for consultation at least twice during construction, or as requested by the *Contractor.*

One properly identified 600 by 600 mm minimum size geotextile sample is to be submitted at the beginning of the Contract. The geotextile sample is intended for visual demonstration prior to product delivery.

12.8 PSXM: KKS CLASSIFICATION SYSTEM

PSXM-1: Plant Classification

The KKS system shall be used by the *Contractor* for classifying and designating both plant and their associated documents. All technical documentation as per Eskom Standard 240-54179170: Technical Documentation Classification and Designation Standard shall contain a KKS code as part of the documentation identification relevant to the plant equipment.

All plant (Process, Electrical, C&I and Civil) shall be coded to KKS Breakdown Level 3. The KKS code shall contain Breakdown Level 1, Breakdown Level 2 and Breakdown Level 3. Omission of any breakdown level shall not be permitted. The system shall be applied from the Concept Stage until Project Closeout. The rules specified in the VGB guidelines will be used but all rules specified in Eskom documents will take precedence.

Detailed nameplate or label list with the service legends and including the KKS Code shall be prepared by the *Contractor* and submitted to the *Employer* for review and comment before commencing manufacture of the labels. All maintainable plant equipment and components shall be labelled including pipework.

The rules for applying the KKS and the KKS codes are contained in the Eskom Standard 240-93576498 and in the publication KKS power plant classification (B105e) 5th Edition 2003 published by Verlag VGB PowerTech Service GmbH (Essen), and the KKS Applications: Guideline and explanations A, B1-4 (B106e).

The *Contractor* shall use Eskom–specific interpretations of the KKS standards, which will be reviewed and agreed on after Contact Award. The following variations relating to 240-93576498 are noted.

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

The *Contractor* shall code all plant within the scope of supply according to the KKS Classification System to Breakdown Level 3 where possible. The relevant KKS codes thus allocated shall appear on all plant related documentation, drawings, lists and correspondence.

The *Contractor* shall be responsible for ensuring the accuracy, completeness and consistency of the designations in all documents. This applies both to designations within documents (plant designations) and of Documents (documents designations). The *Contractor* shall submit these for the *Employer*’s approval.

A list of the KKS designations allocated shall be drawn up by the *Contractor* for each scope of delivery. Methods of KKS designation, list formulation and submission format shall be proposed by the *Contractor* and agreed by the *Employer.*

The *Contractor* shall, as soon as possible after the Contract has been placed, provide the *Employer* with the following:

- Outline drawings or diagrams showing the *Contractor* reference
- Coding for systems and equipment.
- In respect of items procured by the *Contractor* from another
- Manufacture or vendor, the *Contractor* shall provide the name of
- The actual manufacturer and his coded drawing or reference
- Numbers and relevant technical data for identification purposes.

PSXM-2: Plant Labelling

The *Contractor* shall manufacture and install labels according to Eskom Standard 240-71432150: KKS Plant Labelling and Equipment Descriptions Standard. Any abbreviations to plant descriptions shall be prepared in accordance to Eskom standards.

VGB Detailed nameplate or label lists with the service legends and including the KKS Code shall be prepared by the *Contractor* and submitted to the *Employer* for review and comment before commencing the manufacture of the labels.

Any abbreviations to plant descriptions shall be prepared in accordance to the *Employer's* abbreviation standard 240-109607332. Detailed nameplate or label lists with the service legends and including the KKS Code shall be prepared by the *Contractor* and submitted to the *Employer* for review and comment before commencing the manufacture of the labels.

13. RECEIVABLES

This lists the drawings and other documents that are provided by the *Employer* for the *works* are appended under Appendix A. These drawings and documents are included as attachments, bound herein, or are separate electronic files. The Tenderer's pricing accounts for any and all drawings and specification revisions issued to the Tenderer prior to tender submittal.

14. DOCUMENT CONTROL

Document control procedures shall be as detailed under Appendix C.

15. OTHER DOCUMENTATION

The following listed documents are for information purposes only and shall form part of the specifications.

Table 11: Additional Documentation

Document No.	Rev No	Title
AB-Z-Z-AN-0001	0	Kusile User Requirement Specification
146838.23.0200	-	Kusile Project Design Manual
GGR 0992	1	Plant Safety Regulations
203-79326		Kusile Engineering Change Management Work Instruction
203-103437		Technical Documents Submittal and Review *works* Instruction
240-54179170		Technical Documentation Classification and Designation Standard
200-5343	1	Standard Abbreviations

APPENDIX A: LIST OF DRAWINGS

Tag	EMU	Intervention Name	Drawing Number	
AH 001	A	Drop structure	366-	490190
AH 002 a and b	A	Drop Structure AND Gabion basket	366-	490191
AH 006	A	Drop structure	366-	490192
AH 007	A	Drop structure	366-	490193
AH 008	A	Drop structure	366-	490194
AH 009	A	Drop structure	366-	490195
AH 017	A	Drop structure	366-	490210
AH 018	A	Drop structure	366-	490211
AH 019	A	Drop structure	366-	490212
AH 020	A	Drop structure	366-	490213
AH 021	A	Drop structure	366-	490214
AH 022	A	Drop structure	366-	490215
AH 023	A	Drop structure	366-	490203
AH 024	A	Drop structure	366-	490204
AH 025	A	Drop structure	366-	490205
AH 026	A	Drop structure	366-	490206
AH 027	A	Gabion basket	366-	490207
AH 029	A	Drop structure	366-	490209-01
	A	Drop structure	366-	490209-02
AS 002	A	Removal of Alien Vegetation	366-	490106
BH 001	B	Drop structure	366-	490186
BH 002	B	Drop structure	366-	490187
BH 003	B	Drop structure	366-	490188
BH 008	B	Drop structure	366-	490189
BH 012	B	Drop structure	366-	490184
BH 013	B	Drop structure	366-	490182
BH 015	B	Drop structure	366-	490174
EMU A - 01	A	Heat-Cut / Removal of old dam	366-	490109
EMU A - 03	A	Embankment Dam Removal - Soil specification	366-	490110
EMU A - 04	A	Removal of Dam Wall / Head cut	366-	490111
EMU A - 06	A	Collapsed Side Walls / Donga	366-	490225
EMU A - 07	A	Drop Structure / Energy Dissipator	366-	490202
EMU A - 08	A	Head Cut	366-	492965
EMU A - 09	A	Embankment Dam	366-	490217
EMU A - 10	A	By-Pass Channel - Join to Wetland	366-	490216
EMU A - 12	A	Cattle Crossing	366-	490218
EMU A - 13	A	Cattle Crossing / Side Wall Slope	366-	490219
EMU A - 14	A	Cattle Crossing	366-	490220

Tag	EMU	Intervention Name	Drawing Number	
EMU A - 15	A	Weir / Drop Structure	366-	490208
EMU A - 16	A	Cattle Crossing / Drop Structure	366-	490221
EMU A - 17	A	Minor Head cut to rehabilitate	366-	492966
EMU A - 18	A	Infill Artificial Channel	366-	492967
EMU A - 19	A	Infill Artificial Channel	366-	492968
EMU A - 20	A	Cattle Crossing	366-	490222
EMU A - 21	A	Fix Collapsed Bridge	366-	490226
			366-	490227
			366-	490228
			366-	490231
			366-	490232
EMU A - 22	A	Remove Bridge and Dam	366-	492969
EMU B - 01	B	Shaping of erosion sides	366-	492970
EMU B - 02	B	Head cut prevention / sill	366-	492978
EMU B - 03	B	Side slope / shape + stabilise / energy dissipation	366-	492973
EMU B - 04	B	Cattle crossing	366-	490201
EMU B - 05	B	Head cut prevention / sill + Cattle Crossing	366-	490198
EMU B - 08	B	Cattle crossing	366-	490183
EMU B - 09	B	Embankment Dam Removal - Soil specification	366-	492970
EMU B - 10	B	Drop Structure / Energy Dissipator	366-	490181
EMU B - 11	B	Drop Structure / Energy Dissipator	366-	490178
EMU B - 12	B	Drop Structure / Energy Dissipator + Head Cut	366-	490177
EMU B - 13	B	Drop Structure / Energy Dissipator + Head Cut	366-	490176
EMU B - 14	B	Removal of contour berms	366-	492971
EMU B - 15	B	Head-Cut	366-	492974
EMU B - 16	B	Head cut remediation	366-	492975
EMU B - 17	B	Reshape and revegetate	366-	492976
EMU B - 19	B	Reshape and revegetate	366-	492977
EMU B - 20	B	Cattle crossing	366-	490200
EMU B - 21	B	Cattle crossing	366-	490199
EMU B - 22	B	Cattle crossing	366-	490197
EMU B - 23	B	Cattle crossing	366-	490185
EMU B - 24	B	Remove AIPs	366-	490107
EMU B - 25	B	Cattle crossing	366-	490180
EMU B - 26	B	Cattle crossing	366-	490179
EMU B - 27	B	Cattle crossing	366-	490175
EMU B - 28	B	Remove AIPs	366-	490108
ADF-01	Klipfonteinspruit	Remove AIPs	366-	531019
ADF-02	Klipfonteinspruit	Remove AIPs	366-	531020
ADF-03	Klipfonteinspruit	Remove AIPs	366-	531021
ADF-04	Klipfonteinspruit	Remove AIPs	366-	531022

Tag	EMU	Intervention Name	Drawing Number	
ADF-05	Klipfonteinspruit	Remove AIPs	366-	531023
ADF-06	Klipfonteinspruit	Remove AIPs	366-	531024
ADF-07	Klipfonteinspruit	Ameliorate Erosion and Manage Surface Flow	366-	531025
ADF-08	Klipfonteinspruit	Remove AIPs, Ameliorate Erosion, Manage Surface Flow	366-	531026
ADF-09	Klipfonteinspruit	Ameliorate Erosion	366-	531027
ADF-10	None	Install More Outlets	366-	490230
ADF-11	Klipfonteinspruit	Remove AIPs	366-	531029
ADF-12	Klipfonteinspruit	Remove AIPs	366-	531030
ADF-13	Klipfonteinspruit	Remove AIPs	366-	531031

APPENDIX B: DOCUMENTATION MANAGEMENT AND COMMUNICATION

The documentation requirements cover the various engineering stages, from the design stage through fabrication, installation, testing and commissioning and most importantly for the operating, maintenance, and training stage of the project. The *Contractor* ensures that the Technical Documents and Records Management Work Instruction (240-76992014) is used for any documentation requirements. The *Contractor* is responsible for the compilation and the supply of the documentation during the various project stages and to provide the documentation programme to link with the milestone dates. Documentation and drawings are programmed for delivery to meet the milestone dates and in accordance with the agreed VDSS.

1. SUBMITTAL REQUIREMENTS

Contractor Engineering program shall allow a minimum of 21 days for mailing, processing, and review of drawings, documents and data by the *Employer*. The *Contractor* is responsible for the compilation and the supply of all the documentation required during the various project stages and to provide the documentation programmed to link with the milestone dates. Documentation and drawings are programmed for delivery to meet the milestone dates and in accordance with the agreed Vendor Document Submittal Schedule (VDSS) in Appendix B.

Contractor documents submittals are provided in accordance with the Vendor Document Submittal Schedule (VDSS) which is included in Appendix B. *Contractor* documents all documentation that will be sent to the *Employer* in the Master Document List (MDL) as provided by the *Employer* in Appendix C. All documentation, including reports, manuals, etc. is in the English language.

If the *Contractor* makes further changes to the equipment and materials shown on submittals that have been reviewed by the *Employer*, the changes shall be clearly marked on the submittal by the *Contractor* and the submittal process shall be repeated. If changes are made by *Contractor* after delivery to the Plant, as-built drawings indicating the changes shall be prepared by *Contractor* and submitted to *Employer* for review. Any resubmittal of information shall clearly identify the revisions by footnote or by a form of back-circle, with revision block update, as appropriate.

1. All document exchange shall be done using formal Transmittals. The following is the minimum information required for sending transmittals:

    - Title of the document
    - Reason for issuing/submission
    - Transmittal Number
    - Transmittal Name
    - Transmittal Description
    - Contract Number
    - Package Number
    - Transmittal purpose

- Sender Name
- Sender E-Mail
- Sender Organisation
- Recipient Name
- Recipient E-Mail
- Recipient Organisation
- Disclosure Classification
- Date received
- Quantity of documentation referenced on the transmittal
- Number of copies
- Format/medium submitted (e.g. paper, USB, etc.)
- Sender signature
- Recipient signature, once submitted, to acknowledge receipt

2. If a transmittal is in response to an Eskom communication via transmittal, the Eskom Transmittal Number shall be referenced in the transmittal response and shall be provided in addition to the meta-data required as indicated above.
3. The *Contractor* shall follow a structured and standard definition for Transmittal Descriptions, i.e. **a** subject line convention of YYYYMMDD – <Contract & Package Number> – <Vendor> – <Short Description> – <Sender Initials>.
4. The *Contractor* shall follow a structured method of communication as defined within Communication Interface Memorandum (CIM) for any correspondence
5. The *Contractor* shall follow a structured and standard definition for email subjects i.e. **a** subject line convention of YYYYMMDD – < Package File Number> – > – <Email Subject line>.
6. The *Contractor* shall select the purpose for transmittal in line with the standard Eskom Selection Criteria:

    - Issued for Approval
    - Issued for Award
    - Issued for Basic Design
    - Issued for Commissioning
    - Issued for Concept Design
    - Issued for Consideration
    - Issued for Construction
    - Issued for Detail Design
    - Issued for Document Review

- Issued for Handover
- Issued for Information
- Issued for Installation
- Issued for Manufacturing
- Issued for Procurement
- Issued for Review
- Issued for Tender

The *Contractor* is to use the applicable transmittal reference from the list above.

7. Issuing of documents with different transmittal purposes shall be done separately and shall not combined into one transmittal. This will ensure fast and efficient processing of incoming and outgoing transmittals and information exchange.

   Electronic technical data submittals shall be made using the Eskom Document Control email address (KusileDocControl@eskom.co.za) and *Zendto*, a Web-based file transfer service. If *Contractor* does not already have *Zendto* transmittal capability, information is available at https://zendto.eskom.co.za/. (The Uniform Resource Locator [URL] to be used for electronic file submittals will be made available upon Contract award.)

   In case of email submission, the Contractor shall note that if a single file to be transmitted is over 20MB in size, then the document shall be uploaded on Zendto portal.

   Notification to *Employer* that submittal have been posted to *Zendto* shall be in accordance with the correspondence requirements of this Contract. *For the Zendto submission, a transmittal record must be submitted to the project email document control address information the Employer of such a submission.*

   Two hard copy prints shall be submitted to the address indicated for Technical Documents in the Supplementary Terms and Conditions of this Contract. The *Contractor* submits documentation to the Eskom Representative as well as the Project's Documentation Centre in the following media:

   - Electronic copies can be submitted to Eskom Documentation Centre through generic email address agreed to by the project. Electronic copies large for email will be delivered on USB or any form of an external drive, large file transfer protocol and/or hard drives to the Project Documentation Centre. A notification email, with the transmittal note attached, shall be sent to the project generic email address. The Representative will be copied on the email as well.
   - Hard copies shall be submitted to the Eskom Representative accompanied by the Transmittal Note.

8. Drawings

   All drawings must be issued to Eskom in both native CADD format and PDF format as per 240-86973501 (Engineering Drawing Standards – Common Requirements).

Drawings shall be in sufficient detail to indicate the kind, size, arrangement, component weight, breakdown for shipment, and operation of component materials and devices; the external connections, anchorages, and supports required; the dimensions needed for installation and correlation with other materials and equipment; and the information specifically requested in the Schedule of Submittals.

Contractor shall fully complete and certify drawings for compliance with the Contract requirements. Drawings shall have title block entries that clearly indicate the drawing is certified.

Each submitted drawing shall be project unique and shall be clearly marked with the name of the project, unit designation, ***Employer's*** Contract title, ***Employer's*** Contract file number, project equipment or structure nomenclature, component identification numbers, and ***Employer's*** name. Equipment, instrumentation, and other components requiring *Employer* -assigned identification tag numbers shall be clearly identified on the drawings. If standard drawings are submitted, the applicable equipment and devices furnished for the project shall be clearly marked.

Transmittal letters shall identify which Schedule of Submittals item (by item number) is satisfied by each drawing or group of drawings. The transmittal letter shall include the manufacturer's drawing number, revision number, and title for each drawing attached. Each drawing title shall be unique and shall be descriptive of the specific drawing content. Transmittal letters for resubmitted drawings shall include the ***Employer's*** drawing numbers.

The *Contractor* includes the ***Employer's*** drawing number in the drawing title block. This requirement only applies to design drawings developed by the *Contractor* and his *Sub-Contractor*s. It does not apply to drawings developed by manufacturers for equipment and material such as valves, instruments, etc. Drawing numbers will be assigned by the *Employer* as drawings are developed.

The project name shall be listed on all drawings, including manufacturers' drawings. Tag numbers and equipment names shall be listed on all manufacturers' drawings. A separate sheet may be attached to the submittal if needed to adequately list all tag numbers associated with the drawings such as valves or instruments which may have numerous tag numbers associated with it.

The language of all documentation shall be in the English language. The units of measure shall be metric.

The *Contractor* retains project design calculations and information for the entire life cycle of the plant and provides these to the *Employer* on prior written notice at any time notwithstanding the expiry or termination of the contract.

9. Drawing Submittal

All documents and records management will be performed according to Project/Plant Specific Documents and Records Process. Any uncertainty regarding this should be clarified with the *Employer*. The *Contractor* shall comply with all minimum document

metadata as specified in Technical Documentation Classification and Designation Standard (240-54179170).

Contractor shall submit electronic copies of the documents using a fully secure web-based solution providing carefully controlled access to appropriate project information for authorized personnel.

All electronic design data and documents shall be in such a form which will enable importing such data, documents and drawings, including 3-dimensional drawings, seamlessly into the Intergraph SPF (Smart Plant Foundation) system. Hard copy submittals will only be required for the IOM Manuals and final as-built submittals.

Transmittal letters shall be provided with each document submittal. The transmittal letter shall include the *Contractor* drawing number, revision number, and title for each drawing attached. Each drawing title shall be unique and shall be descriptive of the specific drawing content.

Catalogue pages are not acceptable, except as drawings for standard non engineered products and when the catalogue pages provide all dimensional data, all external termination data, and mounting data. The catalogue page shall be submitted with a typed cover page clearly indicating the name of the project, unit designation, specification title, specification number, component identification numbers, model number, *Contractor* drawing number, and *Employer's* name. Drawings shall be submitted with all numerical values in metric units.

10. Information Requirements

The *Employer* requires drawings, documentation, plans, information and data (collectively "Information") from the *Contractor* for two fundamental purposes: namely for the management and execution of the Contract and for the operation, maintenance and support of the *works* during its entire operational phase until disposal and decommissioning.

The *Contractor* shall, during the progress of and upon completion of the *works*, supply the Information required in terms of the Contract and all such Information as may usually be supplied in connection with similar *works*, including, whether or not specified in the Contract, all Information necessary or useful for:

1. Design reviews and the interface management of the *works* with the Project *works*;
2. Quality assurance and control; and
3. The operation, maintenance, support, inspection, integrity management, training and technical optimization of the *works*, over the lifecycle thereof.

The scope of supply of Information from the *Contractor* shall include documents, lists and data according to the types defined in Table 1 below. The document requirement list below is not exhaustive, all documents, lists and data as specified by the relevant SANS standard should be submitted to the *Employer* by the *Contractor*:

Table 1: Typical Document Requirement List

Document Group	Description of document type (includes information data sets)
General	Material handling flow diagrams Procurement schedule Equipment list Valve list Pipeline list Interface list Equipment specifications & data sheets Drawings and data for all equipment and material Installation, Operation, and Maintenance (IOM) Manuals Spare parts list Factory Acceptance Test (FAT) report
Quality Assurance	Quality assurance manual Quality control plans Quality control reports Weld summary index Material traceability certificates Manufacturing test reports Manufacturing Non-Conformance Reports (NCR's)
Civils & Structures	Test certificates
Construction	Site management plan (QA, Safety, Environmental etc.) Construction schedule Site storage requirements for major equipment Construction test records (concrete strength, permeability test, etc.) Maintenance records for all equipment while stored on site

Document Group	Description of document type (includes information data sets)
Commissioning	Commissioning schedule Test & Evaluation Master Plan (TEMP) Commissioning procedures Commissioning database Performance test procedure Performance test reports Field test reports and certificates
Operations	Operating procedures/manuals Plant operational documentation Plant tech specs Incident & upset mitigation procedures
Logistic Support	Maintenance concept/manuals Plant maintenance documentation
Training	Training plan Training manuals and instructions
Safety & Protection	Waste management plan

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

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

The *Employer* reviews the *Contractor*'s submitted documents. The *Contractor* ensures adherence to the *works* Information and that a technically sound design approach is incorporated. Specific information required from the *Contractor* during tender phase and as part of the *works* are as set-out in the VDSS, in Appendix B – Vendor Document Submittal Schedule. Each document submitted to the *Employer* requires a transmittal note (refer to ***Employer's*** template 240-71448626 for minimum metadata requirements) from the *Contractor*. The *Contractor* includes interpretation of results in every report compiled.

All project documents are submitted to the *Employer* in accordance with Project / Plant Specific Technical Documents and Records Management Work Instruction (240-

76992014). The *Contractor* is required to submit documents as electronic and hard copies and both copies must be delivered to the *Employer* with a transmittal note.

11. Documentation recording

The *Contractor* develops, documents and maintains the Master Document List (MDL) with all the required metadata which are submitted to the *Employer* in the monthly basis for tracking purposes irrespective of whether there are updates or not. The MDL includes a list of drawings and documents which contains the following minimum information for each document:

- Date of submission
- Transmittal number
- Transmittal title
- Document description
- Document number (both *Contractor* and *Employer*)
- Document Type
- Revision number
- Document Approval Status
- Document Authorisation Status (i.e. Accepted With Comments, Not Accepted with Comments, Accepted).
- Transmittal reason for Issue
- In addition, the *Contractor* adheres to the following standards:
- Project / Plant Specific Technical Documents and Records Management Procedure (240-531144186)
- SmartPlant for Owner Operators (SPO) Documentation Metadata Standard (240-58552870)
- SmartPlant Data Take-On Standard (240-107305502)

12. Identification of the Documentation

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

- Title of the document
- Document Unique Identification number (Eskom number)
- *Contractor* Document number, if applicable
- Document status
- Revision number
- Document Type

- Document security level
- Document revision table/history
- Page number on the footer
- Document Author/Authoriser/
- Document Originator *Contractor*

The following additional attributes are important for technical documents:

- Package/System name, sub-system if applicable
- Unit/s number
- *Contractor* name
- *Contractor* number
- Plant Identification Codes
- Format and Layout of Documents

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

13. Layout and Typography

Every document should comply with the following font specifications:

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

14. Document Headers

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

15. Naming of files

The *Contractor* will comply with the Eskom standard for naming documentation files. The standard is as follows:

For documents that have approval date and signature

(*YYYYMMDD_DocType_DocumentTitle_UniqueIdentifier_Revision.FileExtention)*

For documents that do not necessarily require the 'Approved Date' and 'Revision & Versioning', use the date of update

(*YYYYMMDD_DocType_DocumentTitle_UniqueIdentifier_Revision.FileExtention)*

All further requirements shall be according to IEC 61355 – 1:2008 (Edition) Classification and designation of documents for plants, systems and equipment – Part 1: Rules and classification tables.

2. DOCUMENTATION REQUIREMENTS

The documentation requirements shall cover the various engineering stages, from the design stage through fabrication, installation, testing and commissioning and most importantly for the operating, maintenance and training stages of the project.

The *Contractor* shall be responsible for the compilation and the supply of the documentation during the various project stages and to provide the documentation programme linked to the milestone dates. Completion Dates for documentation and drawings are scheduled to meet the Key Dates in accordance with the agreed Vendor Document Submission Schedule (VDSS) supplied by the *Employer.*

All documents supplied by the *Contractor* are subject to Eskom's approval. For consistency, it is important that all documents used within the project follow the same layout, style and formatting as described in the Technical Documents and Records Management Work Instruction (240-76992014). Documents such as QCP's, Method Statements, Data Books and other documents impacting the work is accepted by the *Employer* at least 7 working days prior to commencement of the *works*.

Each revision of a document or drawing is 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 are recorded in a revision table contained in each drawing/document. Documents and drawings indicate the *Employer's* 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, the *Employer*'s number is used as the reference number.

2.1 Method Statement Requirements

The Method Statement shall be compiled with the minimum requirements for deliverable construction purposes but limited to the following:

i. Activity

The *Contractor* illustrates the description of the major activities as of the programme described under Programming.

ii. Quantity

The Method Statement shows the quantity of that activity taken from the Bill of Quantities with its unit of measurement; this will directly influence the method to be used.

iii. Method

The Method Statement provides a short but complete description of how the activity will be executed, to engage the *Project Manager* with risks associated the method used. The example would be either by hand, machine, digital,

iv. Sequence

The Method Statement shows the sequence of the activities; this serves as an indication to the planner on how activities will be linked. The sequence must also indicate if, and how activities can be overlapped.

v. Resources

All necessary equipment and labour required to complete a particular activity must be indicated in the Method Statement, this is used to assess the compensation event, should similar activities become a compensation event.

vi. Production Rate

The estimated daily production rate of the resources linking the method and the quantity must be indicated in the Method Statement, the production rate will be the divisor of the quantity to produce the estimated duration that will be indicated in the programme.

vii. Duration

The duration of the activity will be indicated in the Method Statement and will be quotient of quantity and production rate of the activity. This will illustrate if the estimated duration is realistic as stated in bullet number 3 of Clause 31.3 NEC Engineering and Construction Contract.

2.2 Data Book Requirements

The *Contractor* compiles a complete data book for all work done during manufacturing, construction and commission containing the following as a minimum if applicable:

- Scope of work.
- Work Breakdown Structure
- Approved “As built” drawings.
- Method Statement
- Approved and Signed QCP

- Approved Inspection Test Plan.
- Inspection reports.
- Defect Certificate
- NCR
- NCR corrective actions
- All CAR's and corrective actions

The *Contractor* submits documentation according to Documentation Handover Specification (240-128515850) to the Eskom Representative as well as the Project's Documentation Centre in the following media:

- Electronic copies are submitted to Eskom Documentation Centre through generic email address agreed to by the project. Electronic copies large for email are delivered on external drive, large file transfer protocol to the Project Documentation Centre. A notification email, with the transmittal note attached, is sent to the project generic email address. The Representative is copied on the email as well.
- Hard copies are submitted to the Eskom Representative accompanied by the Transmittal Note.

The *Contractor* ensures two (2) sets of documentation are supplied, one (1) set in the form of an electronic format (dwg, dgn, native files and pdf) and one (1) set of paper prints.

3. CONFIGURATION MANAGEMENT

The *Contractor* supplies a comprehensive configuration management program according to ISO 10007 (2nd Edition) to ensure that plant structures, components and computer software conform to approved design requirements. However, a project specific Configuration Management Plan document will be developed which will be aligned to ISO 10007. In addition, the *works* as-built physical and functional characteristics shall be accurately reflected in selected documents and databases, including those for design, procurement, construction, operation, testing and training. The configuration program shall be applicable for use throughout all phases of the project life cycle, including management of spare parts, replacement parts and product upgrades, and shall form part of deliverables for hand-over to the *Employer* for use during the operation and maintenance phases of the plant.

3.1 Change Management

All Design change management shall be performed in accordance with the latest revision of the Kusile Engineering Change Management Work Instruction (240-132735850) and the Engineering Change Management Procedure (240-53114002). The *Employer* shall ensure that *Contractor* is provided with latest revisions of this procedure. Any uncertainty regarding this procedure should be clarified with the *Employer* and clarification updates should be reflected in updated versions of this procedure.

VENDOR DOCUMENT SUBMITTAL SCHEDULE

VENDOR DOCUMENT SUBMITTAL SCHEDULE												
ITEM	SUBMITTAL ITEMS	CALANDER DAYS	PROJECT STAGES									
			PROCUREMENT SPECIFICATION FOR SUB*CONTRACTORS*	CONTRACT AWARD	ORDER	DESIGN FREEZE	MANUFACTURING AND ASSEMBLY	FACTORY ACCEPTANCE TESTING (FAT)	FACTORY RELEASE	DELIVERY	INSTALLATION	SITE ACCEPTANCE TESTING (SAT)	SYSTEM HANDOVER

MASTER DOCUMENT LIST

Kusile Power Station – COMPANY NAME									
DRAWINGS AND SPECIFICATION SCHEDULE									
Doc Code	**Rev.**	**Cust. Doc No.**	**Title**	**Action**	**Actual date**	**Client receipt date**	**Client Document status**	**Client ref letter for doc status**	**Document status**

DOCUMENTATION REQUIREMENTS FOR FINAL HANDOVER

Dossier Chapter	Dossier Sub-Chapter	Dossier Sub-Sub Chapter	Documents for Final Handover
Engineering Documentation	**1.1**	**1.1**	Risk Assessments
	1.2	**1.2**	Non-Conformance Management
Commissioning Documentation	**2.1**	**2.1**	Commissioning Procedure / Manual
	2.2	**2.2**	Handover Certificate
	2.3	**2.3**	Commissioning Certificate
Project Execution	**Mechanical**	**3.1.1**	*Contractor* Application for Eskom's Inspection of the *works* /Part of the *works*
		3.1.2	Data Pack (e.g. Material Certificates, Qualifications, NDE and Welding Documentation, Cutting Instructions, Factory Design Review Reports, etc.)
		3.1.3	Partial/final Inspection certificate
		3.1.4	Defects Notification Certificate/Clearance
		3.1.5	Safety and Housekeeping Certificate
		3.1.6	Safety Clearance Certificate
		3.1.7	Completion Certificate
		3.1.8	Defects Certificate
		3.1.9	Take over Certificate
		3.1.10	Specific Requirements
		3.1.11	KKS and Labelling Certificate
	Civil	**3.2.1**	*Contractor* Application for Eskom's Inspection of the *works* /Part of the *works*
		3.2.2	Data Pack (e.g. Material Certificates, Qualifications, NDE and Welding Documentation, Cutting Instructions, Factory Design Review Reports, etc.)
		3.2.3	Partial/final Inspection certificate
		3.2.4	Defects Notification Certificate/Clearance

Dossier Chapter	Dossier Sub-Chapter	Dossier Sub-Sub Chapter	Documents for Final Handover
		3.2.5	Safety and Housekeeping Certificate
		3.2.6	Safety Clearance Certificate
		3.2.7	Completion Certificate
		3.2.8	Defects Certificate
		3.2.9	Take over Certificate
		3.2.10	Specific Requirements
		3.2.11	KKS and Labelling Certificate
Test and Statutory Certificates	**4.1**	**4.1**	Factory Acceptance Test (FAT)
	4.2	**4.2**	Site Acceptance Test (SAT)
	4.3	**4.3**	Inspection Test Procedures (ITP's)
	4.4	**4.4**	QCP's / QIP's (signed off)
	4.5	**4.5**	COC (Domestic Circuits)
	4.6	**4.6**	Erection Check Sheet
	4.7	**4.7**	Other Safety Valves, Ventilation, Boiler Statutory Tests, Transformer Impact Recording, Boiler Registration Certificate, Type Test Certificates)
	4.8	**4.8**	Synchronisation Tests
	4.9	**4.9**	Grid Code Compliance Certificate
	4.10	**4.10**	Defect List
Safety Requirements	**5.1**	**5.1**	Safety Signs, Labels and Colour Coding
	5.2	**5.2**	Demarcation of Hazardous Area (Certificate & Reports)
	5.3	**5.3**	Lighting
	5.4	**5.4**	Safety and Housekeeping Certificate
Guarantees & Warrantees	**6.1**	**6.1**	Related Extract from Scope of *works* Information Indicating Plant area / Component
	6.2	**6.2**	Certificate from Supplier indicating validity of the guarantee / Warrantees Period

Dossier Chapter	Dossier Sub-Chapter	Dossier Sub-Sub Chapter	Documents for Final Handover
		7	**Special Tool List**
		8	**Insurance Cover (90 Days Notification Period)**
Plant out of Normal Status Approved	**9.1**	**9.1**	Approved Out of Normal Status
	9.2	**9.2**	Out of Normal Status (Pending Approval)
Training	**Competency Declarations**	**10.1**	Training Manual
		10.2	Proof of Training
		10.3.1	Plant Safety Regulations
		10.3.2	High Voltage (HV) Regulations
		10.3.3	PFFR
		10.3.4	Other
Provisional Hand over Certificate	11.1	11.1	Provisional
	11.2	11.2	Pending Approval
	11.3	11.3	Approved
Final Hand over Certificate	12.1	12.1	Provisional
	12.2	12.2	Pending Approval
	12.3	12.3	Approved
Other	13.1	13.1	Factory Acceptance Tests • Signed Protocol Release Report
	13.2	13.2	Shipment and Transportation - • Transportation test results • Transportation PQP
	13.3	13.3	Other Documentation and Reports • Design assumptions • Trade-offs
	13.4	13.4	Design Software • Software listing • CAD software data files
	15.5	15.5	Correspondences • Engineering Instructions (EI's)

Note: The *Contractor* is to liaise with the *Employer* on any items deemed N/A on the above list, this is to be agreed with the *Employer* prior to submittal.