Eskom	Specification	Arnot Power Station

Title:	**Technical Specification for Arnot Power Station – Hazardous waste temporary holding facility**	Unique Identifier:	**AEAP 0131**
		Alternative Reference Number:	**N/A**
		Area of Applicability: `	**Engineering**
		Documentation Type:	**Specification**
		Revision:	**0**
		Total Pages:	37
		Next Review Date:	**N/A**
		Disclosure Classification:	**CONTROLLED DISCLOSURE**

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Date: 02/04/2024	Date: 03/04/2024	Date: 2024/04/05

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EXECUTIVE SUMMARY

Arnot Power Station (PS) is a coal fired power station which is located at Rietkuil in Mpumalanga Province. Arnot PS' current waste storage area (also known as the Scrapyard) is considered a waste storage site where scrap metals and hazardous waste are being stored while awaiting collection for disposal. According to Category C (1) & (2) of the National Environmental Management: Waste Act (Act No. 59 of 2008), List of Waste Management Activities that have or are likely to have, a detrimental effect on the environment, as a result Arnot PS has tmust register its waste facility with the Department of Environment, Forestry & Fisheries (DEFF) for its continued operation.

Furthermore, for the registration to occur, Arnot PS must submit designs that complies with the requirements from the authorities. Currently the site is not designed to any specifications and therefore the project aims to upgrade the Scrapyard waste facility to be compliant with legislative requirements.

A detail design needs to be undertaken for a newly upgraded transfer facility or temporary holding facility for storage of the hazardous waste, which will also comply with all the applicable environmental legislative requirements.

1. INTRODUCTION

Arnot PS requires to construct and/or upgrade its current waste storage facility to comply with legislative requirements, conditions of power station's waste related permits and Eskom Waste Management Standards. During normal operations of the station, various types of hazardous wastes are generated. The Scrapyard waste facility currently stores the following types of hazardous waste:

1. Oil contaminated waste in skips
2. Waste oil drums
3. Chemicals waste drums
4. Scrap metal waste
5. Lagging waste
6. Fluorescent tubes waste

The existing design of the Scrapyard facility is non-compliant with requirements stipulated in the National Environmental Management Waste Act (NEMWA), namely.

1. The facility is not contained within a bund area which is required to contain any spillages and contaminated oil. All waste oil storage areas should be redesigned to include a containment system.
2. The facility spillage containment also requires having a drainage sump. Despite ineffective drainage, oil contaminated waste spillages should be drained into a collection sump which the existing facility currently does not have.
3. Oil contaminated waste inside skips is stored in several areas around the station. Some of the areas have open storage receptacles and as such should be revaluated to be stored and handled within one registered facility.
4. The facility has fencing however not fully access controlled.
5. The facility is operational as a waste storage site but not registered with the authorities.

In addition, this facility poses a threat to the environment and/or health of the employees entering Arnot PS. Therefore, the aim of the project was to redesign and construct a temporary hazardous waste storage facility that will comply with all applicable environmental legalisation.

2. SUPPORTING CLAUSES

This document covers the minimum design and construction technical specification relating to the construction of the temporary hazardous waste storage facility within Arnot PS. Both the design and construction of the storage facility are to be undertaken by the appointed *Contractor* on a turnkey project.

2.1.1 Purpose

The purpose of this document is to describe in detail the scope of services required from potential contractors and outline the minimum construction specifications required for the appointed *Contractor* to execute the project.

2.1.2 Applicability

This document shall apply throughout Arnot PS and all other stakeholders responsible for planning ar executing the project.

2.2 LIST OFREFERENCE PROCEDURES, STANDARDS AND SPECIFICATIONS

2.2.1 Normative

The *Contractor* complies with all standards, specifications and regulations as listed in Appendix A.

2.2.2 Informative

The following reports/documents are for information purposes only and are not requires to be read in conjunction to the detail design report.

[1] 240 -53114002: Engineering Change Management Procedure

[2] 240-76992014: Project/Plant Specific Technical Documents and Records Management Work Instruction

[3] 240-53113685: Design Review Procedure

[4] 240-53113953: Manage Engineering Accountability Procedure

[5] 240-53114026: Project Engineering Change Management Procedure

[6] 240-53114186: Document And Records Management

[7] GGS0462 Eskom - Quality requirements for Engineering and Construction works.

[8] OHS ACT1993 - Occupational Health and Safety Act

[9] ECMA 0079 - Stakeholder Requirements Definition for Hazardous Waste Temporary Holding Facility

[10] ASEN 0008 - Arnot Power Station Waste Management Procedure

[11] 474-58 (Rev1): Document and Records Management

[12] 240-53114002 Engineering Change Management Procedure

[13] National Environmental Management Waste Act, Act 59 of 2008: Norms and Standards for Storage of Waste No 926 of 29 November 2013

[14] Occupational Health and Safety Act, 1993

2.3 DEFINITIONS

2.3.1 Disclosure Classification

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

2.4 ABBREVIATIONS

Abbreviation & Acronym	Description
Arnot PS	Arnot Power Station
CM	Configuration Management
CV	Curriculum Vitae
ECSA	Engineering Council of South Africa
EDMS	Eskom Document Management System
GTE	Group Technology Engineering
ITP	Inspection And Test Plan
NEMWA	National Environmental Management Waste Act
OHS	Occupational Health and Safety
N/A	Not Applicable
QCP	Quality Control Plan
SHE	Safety, Health, Environment
WI	Works Information

2.5 ROLES AND RESPONSIBILITIES

Roles and responsibilities shall be as per the *Employer's* Design Review Procedure [1], that is.

Eskom Arnot Engineering:

The *Employer* will play the role of the design authority ensuring the following:

- The design satisfies the design requirements.
- All relevant Eskom design standards, procedures and guidelines have been adhered to.
- The design is suitable and correct (calculations, philosophy, functionality, etc.).
- The design is integrated by identifying all interfaces with other packages/plant systems/assets and ensuring that these interfaces are catered for.

The *Contractor*:

The *Contractor* will be responsible for the following:

- Design of all works as defined in the Works Information (WI).
- Complying with all regulations and standards.
- Construction of all works as defined in the Works Information.
- Plant labelling

Design Review Committee

Establish agreed acquisition requirements baseline by:

- Verifying whether Works Information and Employer's requirements comply with previously set baseline.
- Verifying that deviations from previously set baseline were identified and managed by means of formal Engineering Change Management.
- Reviewing complete scope of supply/services/extent of work.
- Reviewing all requirements (such as system operating philosophies, performance requirements, and all particular system requirements).
- Reviewing the applicability of all specified codes, standards, and procedures (internal and external).
- Reviewing technical schedules.
- Reviewing technical tender returnable.
- Reviewing referenced drawings if any in Works Information and Employer's requirements.
- Reviewing Bill of Quantities (BOQ) as applicable.
- Reviewing tender technical evaluation strategy.
- Reviewing all detailed system/package boundaries and interfaces.
- Reviewing the technical contents of the contract strategy

2.6 RELATED/SUPPORTING DOCUMENTS

Refer to section 2.2 for all supporting documents related to the project.

2.7 PROCCESS FOR MONTIORING

The process will be monitored via the Engineering Change Management process [12]. This process will allow relevant stakeholders and management to be informed of all decisions made in the design phase by the relevant contractor through the system engineer. The maintenance actions of the new structures and systems will be added to the relevant Plant Maintenance Strategies by the system engineer.

3. WORKS TO BE PERFORMED BY THE CONTRACTOR

3.1 DESCRIPTION OF THE DESIGN WORKS

3.1.1 Overview of the project area

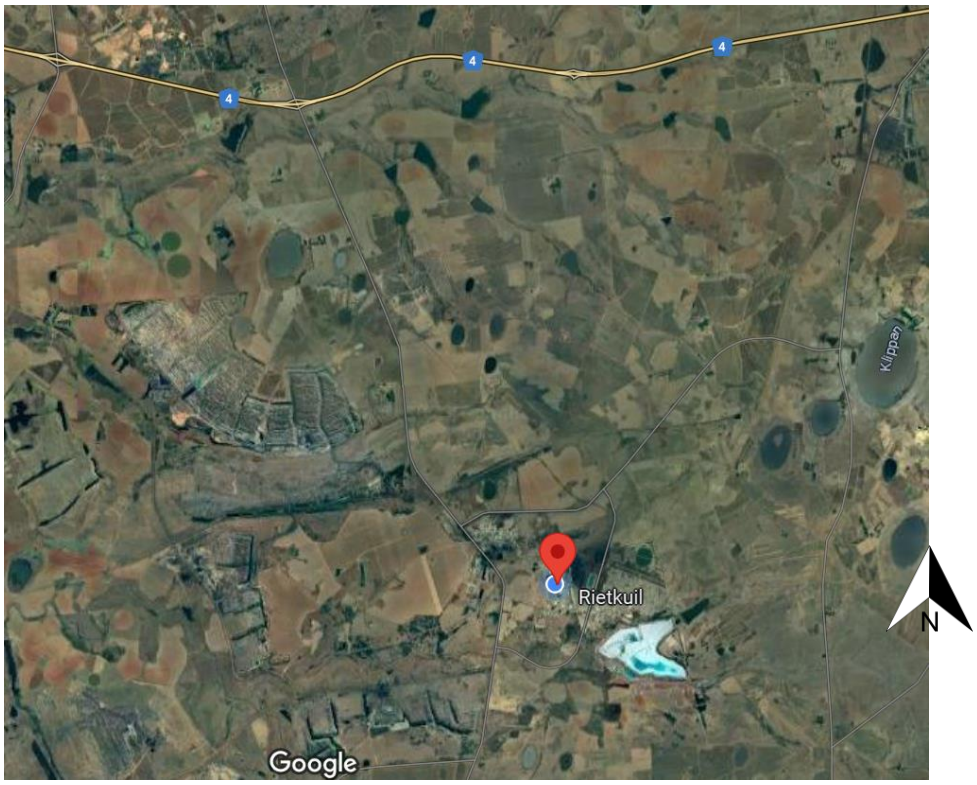

Figure 1: Locality Plan showing Arnot Power Station

The project is at Arnot PS which is located roughly 40km South-East of the town of Middelburg within the Mpumalanga province. The project site area is located immediately South of Arnot PS close to the Southern cooling towers by the contractor's yard. The locality of the Arnot PS is shown in Figure 1. The general view of the existing waste storage facility is as shown in Figure 2 below.

The approximate coordinates of the access gate tor the station are as follows:

- Latitude 25°56'20.3"S
- Longitude 29°47'57.5"E

Figure 2: General view of the Scrapyard at Arnot PS

3.2 EMPLOYER'S OBJECTIVES AND PURPOSE OF THE WORKS

During normal operations of the station, various types of hazardous wastes are generated. Such wastes produced are waste oil stored in skips, oil contaminated waste, waste oil drums, chemical waste drums, scrap metal waste, lagging waste etc. The waste storage facility in which these hazardous wastes are temporarily stored does not comply with the requirements stipulated in the National Environmental Management Waste Act. In addition, these facilities pose a threat to the environment and/or health of the employees entering the power station.

Therefore, the *Employer's* objective is to appoint a *Contractor* to redesign and/or upgrade and provide construction services for all the works required for a temporary hazardous waste storage facility at Arnot PS that will comply with all applicable environmental legalisations.

The works will be divided into two phases.

Phase 1: Design of the facility for review by the *Employer* and approval by the Authorities

Phase 2: Construction of the facility.

3.3 SCOPE OF WORK REQUIREMENTS

The *Contractor* is responsible for the supply, design and construction/installation and commissioning of the below mentioned *works* for temporary hazardous waste storage facility at Arnot PS. The design and/or construction drawings must be submitted to the *Project Manager* in advance in order for the *Employer* to review and accept. A method statement, clearly defining the execution of the *works*, must be submitted to the *Project Manager* for approval as part of the design package.

3.3.1 Design responsibility requirements

The *Contractor* undertakes the below mentioned design responsibility.

i. The Contractor takes full professional accountability and liability for all designs done by the Contractor.
ii. The Contractor is responsible for the design of all temporary works required for the execution of the project.

iii. The Contractor takes full professional accountability and liability for all designs of all temporary works required for execution of the project.

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

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

vi. The Contractor's design is required to be in accordance with all National Standards and Specifications referenced in this works information as indicated in Section 2.2.

vii. The Contractor submits all designs drawings in electronic format, i.e., drawings in CAD format (Microstation *.dgn or AutoCAD *.dwg) and calculations, specification, etc. in Microsoft Office, Microsoft Excel or .pdf format. Drawings are to be done on Eskom drawing sheets, which will be provided. The Contractor's title block, etc. can be added to the left of Eskom's title block.

3.3.2 Civil Works requirements

The *Contractor* design team is responsible to ensure all the civil & structural design requirements for the waste storage facility are provided. The concept design of all civil and structural requirements for the new/upgraded hazardous waste facility should include a review and/or assessment of the current waste site (Scrapyard) and a feasibility study on the different design options to be be considered for its upgrade.

i. Hazardous waste storage area

- Design and construct a steel structure according to the produced design drawings and specifications.
- Design and construct concrete floor to slopes with waste sump and fire /oil trap complete with supports and covers/ gratings to specification.
- Supply and fit steel IBR profile (0.8 thick mm) and clear polycarbonate IBR profile roof sheeting, complete with all flashings to specifications.
- Supply and fit steel IBR profile and clear polycarbonate IBR profile wall cladding, complete with all flashings to specifications.
- Design, supply and install emergency shower to manufacturer's instructions.
- Design, supply and install all water and drainage as per the requirements.
- Design, supply and install a suitable capacity overhead crane for the waste storage area's operational requirements. The overhead crane includes the overhead crane beam, hoist, and long and cross travel drives, crane wheels, rails, rail stops and brakes.

ii. Operator office, kitchen & toilets building.

- Design and construct a brick building with a kitchen and toilets to specifications.
- Supply and fit steel IBR profile roof sheeting, complete with all flashings as per drawings and specifications.
- Design, supply and install all water and drainage requirements.
- Design, supply and install all electrical, lighting and air conditioning requirements.

iii. Access road

- Design and construct an access road and its drainage system to specification.

3.3.2.1.1 Design criteria and operations

The *Contractor* will use the following design criteria to develop the concept to detail design of the waste storage facility:

i. Eliminate the environmental impacts caused by the store hazardous waste.
ii. The facility is required to cater for the placement of 6 m^3 closed skips.
iii. Access controlled environment is required for the storage facility.
iv. Ease of removing and placing of skips.
v. Ease of constructability and maintainability of the facility.
vi. Design for purpose and cost saving in mind.
vii. Compliance to the applicable codes and standards.

During normal station operations, the below are the waste quantities/volumes for the various types of hazardous wastes Arnot PS generates.

i. Oil-contaminated waste in skips – 4 x 6m^3 skips per month.
ii. Waste oil drums – 40 x 210 litres per month
iii. Chemicals waste drums -1 x year
iv. Scrap metal waste - 138ton per month
v. Lagging waste – 10 x compactor truck during outages
vi. Fluorescent tubes waste – 210 bulbs per month

The *Contractor* designs and size the transfer facility in line with Category C (2); which will entail the registration of the new site with DEFF.

3.3.2.1.2 Waste facility operations

The *Contractor* will be responsible for the design, production of fabrication drawings and the installation of the area earmarked for oil contaminated waste skips and other types on wastes as indicated in 3.3.2.1. Since the facility is located next to an access road, the functioning of all gates should not encroach onto the road. For this requirement to be satisfied, the bund facility storage area is required to be filled with concrete.

Waste skip trucks are to be utilised to collect the temporarily stored waste at the facility. The structure should be strategically positioned to allow sufficient space for the skip trucks to turn and reverse up the installed ramp to access the waste skips. In addition, there should be sufficient clearance between the floor slab and the roof of the facility to ensure that the waste skips can be accessed. The drainage sump

is to flush with water and a mobile pump is to be utilised to regularly drain the sump, to prevent overflows.

Forklifts will be utilised to place and remove the oil and chemical waste barrels/drums from the facility to the collection vehicle whereby the collected waste will be transported off-site for disposal. The facility should be designed to ensure sufficient space is available for forklift to turn and reverse around the entire structure.

3.3.2.1.3 Design deliverables

The *Contractor* will supply all the construction drawings as output to the *Works Information* in order for him to execute the project as per specifications. The design package will include but not limited to:

i. Detail architecture specifications in the form of construction drawings.
ii. Site layout drawings.
iii. Detailed structural steel layouts and specifications in the form of construction drawings.
iv. Detailed concrete layouts and specifications in the form of construction drawings.
v. Detailed reinforcement drawings
vi. Bending schedules
vii. Detailed access road layouts and specifications in the form of construction drawings.
viii. Modified fencing arrangement and access gate details.

3.3.3 Electrical Requirements

The *Contractor* design and provides construction of low energy lighting for the facility and its affected area. The *Contractor* provides the electrical detail designs, manufactures, constructs, supplies and installs the Distribution Board, Lighting Luminaires, plug sockets, welding plugs, power cables including cable racks and ensure the new waste facility is bonded to the existing earth mat in accordance with the associated standards, the designs should be performed in accordance with SANS 10114-1 (Interior Lighting Design), SANS 10142-1 (The wiring of premises part 1: Low voltage installations) and 240-55714363 (Coal Fired Power Stations Lighting and Small Power Installation Standard).

3.3.3.1 Lighting design requirements

i. Supply and install sufficient switches for switching on and off the high bay luminaires.
ii. Supply and install High Pressure Sodium, Mast-system Lighting.
iii. The Mast-system Lighting shall also be switched on and off via the day light switch.

The manufacturing, construction and testing of interior and exterior lighting accessories shall be done in accordance with SANS 10142-1 (The wiring of premises part 1: Low voltage installations), 240-55714363 (Coal Fired Power Stations Lighting and Small Power Installation Standard, and SANS 10114-1 (Interior Lighting Design)

3.3.3.2 Distribution Board requirements

The Distribution Board shall be designed in accordance with the latest standard for Coal Fired Power Stations Lighting and Small Power Installation (240-55714363) as well as SANS 10142-1 (The wiring of premises part 1: Low voltage installations).

3.3.3.3 Power supply requirements

The power cables and cable racks shall be done in accordance with 240-56227443 (Requirements for Control and Power Cables for Power Stations Standard).

3.3.3.4 Earthing and Lightning Protection Requirements

For the earthing and lightning protection Works, the *Contractor* ensures:

i. All new electrical equipment to be installed is earthed and properly bonded to the existing earth mat in accordance with the requirements of SANS 10142-1 and the Earthing and Lightning Protection Standard (240-56356396).
ii. Conduct an earth continuity test and provide certification for quality controls.
iii. Ensure that new equipment is interfacing with all the other system requirements of the plant/installation.
iv. Produce all documentation and drawings for the design.

The earthing and lightning protection will comply with the Earthing and Lightning Protection Standard (240-56356396). In addition, the lightning protection will comply to SANS 61024 and SANS 10313.

3.3.4 C&I Requirements

i. The *Contractor* designs and installs the following systems .
    - Optical Smoke/Flame Detectors.
    - Camera surveillance system.
    - PA system linked to Arnot's system.

3.3.5 Fire Protection requirements

ii. The Contractor compiles a fire risk assessment and fire detection and protection strategy as part of the design package submittal, for approval by the Employer.
iii. The fire risk assessment of the holding facility to include probable ignition sources, fire hazards, propagation, fire loads, and possible fire consequences.
iv. The combination of facilities to be provided in a warehouse, including the design of buildings, all safety-related and fire-related facilities shall be determined by a logical process that considers all relevant circumstances, risks and uses to which the warehouse will be subjected.

v. The requirements for fire detection and protection systems are in accordance with the latest revisions of SANS 10400, SANS 10400 T, SANS 10400 W, SANS 10139.
vi. The storage areas are classified in classes of occupancy as per SANS 10400
vii. The assessment and design strategy for fire protection should consider the following: segregations; separation; containment; spillage control; fire traps; construction materials; adequate ventilation where there are possible fumes; smoke or heat control systems if required etc.
viii. Where highly flammable gases or flammable liquids are stored, effective extraction shall be provided and the ventilation shall be so efficient as to prevent the formation of an explosive atmosphere
ix. Fire areas separating elements : Fire resistance of each wall that acts as a separating element shall be at least a) 120 min in the case of a wall adjoining a storage area of occupancy class J1, and b) 60 min in the case of a wall adjoining a storage area of occupancy class J2 or J3Where piping, ducting and electric cables penetrate a separating wall, they shall sealed around as to prevent the spread of fire.
x. In areas where flammable are stored, appropriate measures shall be taken to prevent the accumulation of electrostatic charges or to discharge these under controlled circumstances. The relevant provisions of SANS 10123 shall apply
xi. All exit doors shall be easy to open in the dark or in dense smoke.
xii. Emergency exits shall be provided in addition to the main exit
xiii. All openings in separating walls shall be fitted with self-closing fire-door assemblies of at least the same fire resistance as the wall itself, and that comply with the requirements of SANS 1253.
xiv. The design and installation of fire detection system, fixed firefighting equipment and portable extinguishers will be informed by the fire risk assessment

3.3.6 Signage requirements

i. The *Contractor* is required to provide applicable signage's for the following system:
viii. Fire Protection system.
ix. Hazardous waste demarcated locations/areas as per SANS Code 0228 requirements.
x. Access control system
ii. The Contractor provides and installs all signs in accordance with SANS 1186.
iii. Symbolic safety signs shall comply with SANS 1186-1 and shall be used as necessary outside the warehouse to denote safety-related features of the premises, including the following: a) "no smoking", "no naked flames" and "no fires" restrictions and other specific hazard warnings; b) the positions and types of fire-related equipment (such as extinguishers, hose reels, hydrants, mains water supplies and alarm switches); and c) areas in which protective clothing or apparatus is

required; d) first-aid stations, equipment and apparatus; and e) emergency exit routes and other directional information.

iv. Every type of storage area inside a warehouse shall be clearly demarcated, for example separate storage areas for poisons, flammables and corrosives shall display the relevant hazard class.

3.4 PROJECT DELIVERABLES

- Project plan detailing all the design activities and timelines for review and acceptance by the *Employer*.
- Investigation report(s) for further engineering and/or environmental studies that may be required to conclude detail design phase for the infrastructure in Section 3.3.
- Presentation of the final design to DWS/ DEFF for approval if required.
- Approved detail design report and drawings outlining the design of the entire facility with the associated infrastructure.
- Construction bill of quantities.
- Operating plan manual outlining the new landfill operations.
- Closure and rehabilitation plan report for the landfill.

3.5 PROCEDURE FOR SUBMISSION AND ACCEPTANCE OF THE DESIGNS

The *Contractor* or his appointed *Consultant (herein used interchangeably)* is to carry out this work in accordance with the requirements and standards indicated in Section 3.1 and with the required legal and statutory requirements. The designer is permitted to use best practice engineering solution and make reasonable assumptions to complete the works.

All the designs shall be passed on to the *Project Manager* for review and approval prior to placement of any order or procurement of the designs or submission to the authorities.

3.5.1 Design Review Procedure

Where the *Consultant* has design work in their scope, the *Consultant* is the Design Authority as defined in the Design Review Procedure (240-53113685). The *Consultant* is responsible for following this design procedure and conducting all the design reviews as specified in this procedure. The *Consultant* is responsible for conducting the following design reviews:

i. Detail Design Freeze Review
ii. Integrated Design Review

3.5.2 Process for Submission of Documents

The *Consultant* submits all documents according to the accepted VDSS. The process for the submission of documents is described below:

i. The Consultant submits the documents and drawings to the Project Manager.
ii. The Project Manager's Document Controller registers the documents.
iii. The Project Manager's Document Controller will supply the documents/drawings to all relevant parties within the Project Manager's project team.
iv. The Project Manager's team reviews the documents/drawings and will submit all comments or inputs to the Project Manager and the Project Manager submits to the Consultant for consideration.
v. If the Project Manager finds major deficiencies in the submitted documents and drawings, the Consultant revises the documents and drawings and resubmits to the Project Manager.
vi. The Project Manager reviews the documents and drawings and if no major deficiencies are found, the Consultant organises a Design Review session.
vii. The Project Manager and the Consultant conduct a Design Review.
viii. If any fundamental errors were found in the designs or further actions are required, the Consultant record all concerns raised and revises the designs.
ix. The Consultant organises a Design Review session once all designs were revised according to the concerns raised by the Project Manager.
x. If no fundamental errors were found in the designs during the Design Review session, the Consultant compiles the Design Review minutes or report and submits it to the Project Manager.
xi. The Project Manager's Document Controller registers the report.
xii. The Project Manager's team reviews the Consultant's report/minutes. If the report/minutes are not acceptable, the Consultant revises the report/minutes and resubmits to the Project Manager.
xiii. The Project Manager will accept the Consultant's design once the report/minutes are accepted by the Project Manager's team.

4. MANAGEMENT AND START-UP

4.1 MANAGEMENT MEETINGS

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

Meetings of a specialist nature may be convened as specified elsewhere in this Works Information or if not so specified by persons and at times and locations to suit the Parties, the nature, and the progress of the *works*. Records of these meetings shall be submitted to the *Project Manager* by the person convening the meeting within five days of the meeting.

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

All meetings are recorded using minutes and attendance registers prepared and circulated by the person who convened the meeting.

During the scheduled meetings, the *Contractor* reports the overall progress and the following as a minimum requirement:

xiv. *Contractor's* current activity progress and planned finish dated
xv. *Contractor's* planned start and finish dates for the works
xvi. Discussion on the *Contractor's* programme
xvii. Health, safety and quality issues
xviii. The progress of any other relevant activities
xix. Discussion on any technical and commercial issues
xx. Problem areas or concerns.

4.2 DOCUMENTATION CONTROL

All communications from the *Contractor* carries the contract number and title and is numbered sequentially on the basis of the communication source.

The *Employer* responds in likely manner, numbering communications. Note: All correspondence headings include:

i. Arnot Power Station
ii. The Contract or order description
iii. The Employer's contract or order number
iv. The correspondence subject matter

Where appropriate, the correspondence includes the *Employer's* reference, i.e., initials of contact person and *Employer's* letter reference.

All documents, correspondence, certificates, and all wording on drawings are to be in English. The *Employer* will not undertake any translation, and any errors or misunderstandings made by the *ContractorContractor,* or his sub-contractor and their agents and officers shall be deemed to be the responsibility of the *Contractor*.

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

4.2.1 Change Management

Design change management is performed in accordance to the latest revision of the Eskom Project Change Management Procedure (240-53114026) [1] and the *Employer* ensures that the *Contractor* is provided with latest revisions of the procedure. Any uncertainty regarding this procedure should be clarified with the *Employer* and clarification updates are reflected in updated versions of this procedure.

4.2.2 KKS Classification System

4.2.2.1 Plant Codification

The KKS Keypart is used by the *Contractor* for classifying and designating the new equipment and infrastructure and their associated documents for the waste facility. The rules for applying the KKS codes are contained in the KKS Standards that is to be provided by the *Employer*. The *Contractor* uses the Arnot KKS Coding Manual which will be advised after signing of the Contract Agreement.

Codification of equipment and infrastructure is generated by the *Employer*; the *Contractor* submits a request for coding of instruments and equipment to the *Project Manager*. Labelling of all equipment, infrastructure and documentation supplied as part of *works* is the responsibility of the *Contractor.*

The *Contractor* makes use of the relevant codification standard provided by the *Employer*. Unless otherwise stated, the codification is limited to the lowest component level of coding and applies to all systems included in the *works*.

English descriptions are provided for all labelling. Abbreviations to description on labels are generally not acceptable. Where abbreviation is unavoidable due to the limited number of characters that can be engraved on labels abbreviations are in accordance with the with the *Employer's* abbreviation standard. Plant coding is done according to the following standards:

i. 4011 - Plant Labelling & Coding Procedure
ii. 240-109607332 - Eskom plant Labelling Abbreviation Standard

The *Contractor* is 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 (document designations). The *Contractor* submits these for the *Employer's* acceptance.

The *Contractor* provides the *Employer* with outline drawings or diagrams showing the *Contractor's* reference coding for materials as per schedule of submittals.

4.2.2.2 Plant Labelling

The *Contractor* manufactures and installs labels according to the Arnot Plant Labelling Guideline that will be provided for all the new equipment and infrastructure. Detailed nameplate or label lists with the service legends, including the KKS code are prepared by the *Contractor*, are to be submitted to the *Employer* for review and comment before commencing with the manufacturing of labels.

4.3 ENVIRONMENTAL CONSTRAINTS AND MANAGEMENT

The *Contractor* ensures that all goods, services or works supplied in terms of the Contract comply with all applicable environmental legislations. The *Contractor* is responsible for keeping the work area clean of any environmental waste. All waste introduced and/or produced on the *Employer's* premises by the *Contractor* for this Contract, is handled in accordance with the minimum requirements for the Handling and Disposal of Hazardous Waste in terms of the Government Legislation as proclaimed by the Department of Water Affairs and Forestry and Employer's environmental requirements (Waste Management Procedure [32-245] and Management of Waste at Arnot PS.

All environmental incidents must be reported to the *Project Manager* within 24 hours of such occurrences. All environmental incidents occurring on the Project Site and/or on the *Employer's* property must be recorded detailing how each incident was dealt with in an Environmental Incident register.

4.4 QUALITY ASSURANCE REQUIREMENTS

4.4.1 General

The *Contractor* complies with the *Employer's* quality and technical requirement as included in this works information.

4.4.2 Quality Management Documents Requirements

The *Contractor* is required to compile and submit to the *Project Manager* all QCPs and ITPs for review and acceptance. The *Contractor* submits to the *Project Manager* with a detailed contract organogram showing the quality personnel to be used in the *contract*.

The *Contractor* submits as a minimum the following documents, as required by the *Project Manager*, which requirements does not constitute a compensation event, during the execution of the works:

- Updated QCP register including the *Client's* Intervention points.
- Inspection notifications accompanied by their inspection report.
- Non-conformance and Defect registers and reports.
- Updated site inspection schedules.
- Inspection and test reports
- Monthly contract quality progress report
- Data books for the completed *works*.

4.4.3 Quality Responsibility

The *Contractor* is accountable for the quality of the output and liable for any failures. The *Contractor* is responsible for defining the level of intervention of QA/QC or inspections. Such intervention points are to be in line with the *Employer's* requirements.

The *Contractor* is responsible for defining the level of intervention of QA/QC or inspections to be imposed on all Sub-Contractor's, suppliers and sub-suppliers and must ensure that these are in line with the *Employer's* requirements.

The intervention requirements take into consideration the criticality of the *plant* and *materials*. The interventions points include all witness, hold, verification, review and approval points required by the *Employer*. Failure by the *Contractor* to allow for such intervention points will constitute a non-conformance.

4.4.4 Inspections

The *Contractor* is required to conduct sufficient inspections and tests to satisfy himself that all requirements of the Works Information are being met and the results of inspections and tests shall be submitted to the *Project Manager* in accordance with the *Contractor's* Quality Management System (i.e., accepted QCP/ITP). The *Employer* only verifies that the *works* is conducted as per the *contract*.

Where the *Contractor's* or *Employer's* inspections and/or tests reveal that the requirements of the Works Information have not been attained, the *Contractor* is required, at his expense, to rectify the work to the extent that it does conform with the Works Information.

The *Contractor* drafts a QCP or ITP which shows each activity from the Works Information and submits to the *Project Manager* for acceptance. The *Contractor* provides suitably qualified personnel to conduct onsite inspections.

The *Contractor* ensures that all *works* are inspected and approved before the *Employer* is invited for verification/inspection.

The *Contractor* provides a minimum of 2 working days' notice when inviting the *Employer* to verify/inspect the *works*. The notice to the *Employer* is to contain as a minimum the type of inspection to be conducted, structure/component to be inspected and all relevant QC report and/or documents to be filled/completed.

Damages because of the *Contract's* failure to comply with the inspection notice period as specified in the above paragraph will be borne by the *Contractor* and no compensation events will arise out of this.

4.4.5 Non-Conformance and Defects

Where NCR's and defects notifications are issued, the *Contractor* acknowledges receipt within 48 hours and proposes corrective and preventive actions to the *Project Manager* as per the *contract* response period. The corrective and preventive actions will include the implementation and completion dates. Progress on all NCR's and defect notifications issued to the *Contractor* must be report the *Project Manager* on a weekly basis.

The *Contractor's* quality manager keeps a register of all NCR's and defect notifications issued. Deviations from the *contract* are treated as a non-conformance. Records of NCRs and Defect Notifications are kept and form part of the data book records.

4.4.6 Quality Reporting

The *Contractor* submits a monthly quality report, on the last working day of the month, to the *Project Manager*. The report includes nut not limited to the following:

i. A register of NCRs and defects
ii. Updated QCP/ITP register
iii. QA monthly report summary
iv. Planned and completed local inspection dates
v. Completed and outstanding inspections
vi. Principal material orders and stocks on site
vii. *Contractor's* equipment, plant and temporary works on the site or due to be delivered to or removed from the site.

4.4.7 Preservation and transportation Requirements

The *Contractor* is responsible for ensuring that all products are preserved in their appropriate manner as described in their specifications or in Eskom's Preservation, Shipping and Transportation procedures as applicable. The *Employer* may choose to witness the packaging, loading, and offloading of the products depending on their criticality, this will be indicated in the intervention points on the QCP/ITP documents.

The *Contractor* also ensures that all storage requirements for products are properly implemented to preserve the products against adverse conditions, deterioration, damage, etc. Storage and preservation procedures for the different products must be submitted to the *Project Manager* for review and acceptance. The *Employer* may request to inspect the stored products at any given point during the storage period of the product.

4.5 PROGRAMMING CONSTRAINTS

4.5.1 Methods and Procedures

4.5.1.1 General

Construction methods must be of such a nature that no person, property, or improvements in the vicinity of the works is endangered. The *Employer* accepts no responsibility for any *works* executed without written permission outside the site of *works*.

4.5.1.2 Method Statement

The *Contractor* submits a detailed Construction Method Statements for each activity of his work, together with activity durations, to the *Project Manager* for review and acceptance prior to starting any work. As a minimum, the following requirements are to be included in the method statement:

i. The scope of the Method Statement

ii. Activity:

The Contractor illustrates the description of the major activities as of the construction programme.

iii. Quantity:

The method statement shows the quantity of that activity taken from the Bill of Quantities with its unit of measurement which is directly influenced by the method to be used.

iv. Method

The Method Statement provides a short but complete description of how the activity will be executed and highlighting the risks associated with the method to be used.

v. Sequence

The Method Statement shows the sequence of the activities that will be required to perform a particular task taking into consideration access restrictions and safety requirements.

vi. Resource

All necessary plant, equipment and labour required to complete a particular activity must be indicated. The Method Statement is to include a clear description of the responsibilities of the *Contractor's* personnel involved in the activity, including (where applicable) his Project Manager, Site Quality Manager, Site Engineer, Health and Safety Manager, Technical Office Manager, Production Manager, Supervisor, Environmental Officer and other personnel required for the activity work.

vii. Duration

The duration of the activity will be indicated in the Method Statement.

viii. Quality control points as accepted by the *Project Manager*

ix. Temporary works to be used including *Project Manager's* acceptance where such is supported off existing structures

x. Rigging studies and design calculations where applicable

xi. Manufacturer's literature/ Technical Data Sheets for all materials used including product description, composition, material and performance properties, installation and application procedures, use limitations and recommendations.

xii. Plan for confining, collecting, and disposing of broken concrete and other waste materials as a result of removal operations, where applicable

xiii. Works required to safeguard existing infrastructure and services.

xiv. Risk assessments associated with shutdown of plant/ equipment where deemed necessary, in order to execute the works

All work Method Statements include the name and qualification of the personnel working in the specified activity in conjunction with the requirements as set out in Supplier Quality Management Specification (240-105658000).

5. CONSTRUCTION

5.1 NOTIFICATION OF CONSTRUCTION WORK

The Construction Regulations require that the *Contractor*, as the main *Contractor*, inform the provincial director of the Department of Labour before carrying out any work on the Site where the work:

i. Involves the demolition of a structure exceeding a height of three meters, the use of explosives or the dismantling of fixed plant at a height greater than three meters.

ii. Exceeds 30 days or will involve more than 300 person days of construction work and includes excavation work deeper than one meter: or working at a height greater than three meters above ground or a landing.

5.2 GENERAL

The *Contractor* carries out the civil, structural, and building portion of the *works* in accordance with the Occupational Health and Safety Act (85/1993): Construction Regulations, 2014 the National Building Regulations, the South African Environment Protection Act, the waste management code of practice and the regulations promulgated thereunder and Eskom Safety, Health, Environment and Quality (SHEQ) Policy 32-727 for all *works.*

The *Contractor* provides all labour, installation tackle, gear and tools, vehicles, rigging tackle, temporary works/ scaffolding including any geotechnical works required, craneage and foundations for such, consumables, bulk mixing plant, site workshops, site offices, stores, facilities, Equipment, and cleaning materials required to Provide the Works. The *Contractor* is responsible for the supply/ procurement of Plant and Material, fabrication/manufacturing, shop detailing, painting/ galvanising, handling, shipping, storage, testing, delivery, off-loading, erection/construction, disposal of debris, final painting and finishing

complete in every detail of structural steelwork, concrete structures, miscellaneous support steel and concrete, access platforms, staircases, foundations, equipment, and spares required to supply the *works*.

The *Contractor* provides all the test equipment for testing, the sub-assemblies and the functional groups for site testing, commissioning, and performance testing.

The *Contractor* provides all necessary temporary works required to complete the *works.* This includes scaffolding, suspended platforms, rope access work, material hoists, cranes, services etc.

During the erection period, the *Contractor* as a builder and/or user of machinery performs 'building work' in terms of OHS Act. The *Contractor*, before taking occupation on a Site, obtains a permit to work from the *Project Manager*. Before a part of the Site is released for access to Others, the said part conforms to the safety requirements of OHS Act. The party taking access then becomes the 'User' in terms of the OHS Act. The releasing of a part of the Site in the above-described manner does not relieve the *'Contractor* Giving Access' of any of his obligations in terms of his contract with the *Employer*. No unauthorised person(s) enters into any prohibited/restricted area. Daily dairies/logs/data books are kept and signed by the *Contractor* and are also signed off daily by the *Supervisor.* The following is to be recorded (as a minimum) in the daily diaries:

i. Manpower and Equipment used,
ii. Weather conditions,
iii. Description of any unique occurrences, incidents, or accidents,
iv. Delays and reasons for the delays,
v. Industrial relations abnormalities,
vi. Interface and access problems,
vii. Description of activities to be performed,
viii. Recording of on-site tests, for example a concrete slump test.

In addition to the, the *Contractor* adheres to the following:

i. The Contractor is restricted to the Site.
ii. The Contractor is not to enter any other areas and ensures that his employees abide by the regulations.
iii. The Contractor performs all hoisting and lifting by qualified riggers.
iv. The Contractor's Equipment does not impair the operation or access to the plant.
v. The Contractor provides any temporary or expendable materials required for the storage of material.
vi. The Contractor safeguards and secures all items whilst in the Contractor's custody and control, until completion of the works.
vii. The adjacent plant and equipment are not modified without written permission from the Project Manager. Modification in this sense includes, but is not limited to the following:
    - Welding onto existing plant,

- Drilling into structural steel or concrete,
- Cutting or removing
- Loading adjacent structures.

All items that are assembled and constructed off site are listed and provided to the *Project Manager*. From this an ITP is developed between the *Project Manager* and the *Contractor* to determine the intervention points.

5.3 WORK METHOD STATEMENT

The *Contractor* provides a detailed work Method Statement for each activity of his work, together with activity durations. In addition to a description of the method of constructing the *works*, the *Contractor*, in his work Method Statement, includes the following as a minimum:

i. The scope of the particular Method Statement.
ii. A comprehensive description of the activity.
iii. Construction methodology and sequence of construction taking into consideration access restrictions and safety requirements.
iv. How the Contractor has considered the constraints for constructing the works, including those listed in [provide section number where constraints were listed].
v. A clear description of the responsibilities of the Contractor's personnel involved in the activity, including (where applicable) his Project Manager, Site Quality Manager, Site Engineer, Health and Safety Manager, Technical Office Manager, Production Manager, Supervisor, Environmental Officer and other personnel required for the activity work.
vi. Reference to applicable statutory requirements and how the requirements have been taken into account.
vii. Health, safety and quality control for the activity.
viii. All plant, equipment and machinery required to complete activity.
ix. Quality control points as accepted by the Project Manager.
x. Laydown areas requirements.
xi. Temporary works to be used including Project Manager's acceptance where such is supported off existing structures.
xii. Rigging studies and design calculations where applicable.
xiii. Manufacturer's literature/ Technical Data Sheets for all materials used including product description, composition, material and performance properties, installation and application procedures, use limitations and recommendations.
xiv. Plan for confining, collecting and disposing of waste materials as a result of removal operations, where applicable.
xv. Works required to safeguard existing infrastructure and services.

xvi. Risk assessments associated with shutdown of plant/ equipment where deemed necessary, in order to execute the works.

All work Method Statements include the name and qualification of the personnel working in the specified activity in conjunction with the requirements as set out in Supplier Quality Management Specification (240-105658000). All Method Statements are reviewed and accepted by *Project Manager* prior to starting any work.

5.4 GENERAL CONSTRUCTION WORK METHOD STATEMENT/CONSTRUCTION EXECUTION PLAN

The *Contractor* submits a general Construction Work Method Statement taking into consideration the various phases of the project. This Method Statement clearly illustrates how the *Contractor* accounts for the risks of this project, *["including the risk of not completing the construction within the outage duration", add if applicable]*. This Method Statement is tailored to address the specified project objectives and requirements. This Method Statement adequately deals with the critical characteristics of the project.

The Construction Work Method Statement includes, at minimum, the following:

i. Constraints identified and considered by the Contractor.
ii. Interfacing with Others; the Contractor illustrates an understanding of the work that is to be completed by Others and accommodates for the completion of such work in his methodology.
iii. Description and illustrations of a construction traffic plan, use of laydown areas and plot plan.
iv. Shifts and hand overs for the various sections of the works, this information is to enable the Employer to integrate the programmes of the various contractors.
v. Design tools and systems that the Contractor plans to use.
vi. Detailed risk assessment which lists risks specific to the works and is accompanied with associated proposed mitigations.
vii. List and description of plant and machinery required to carry out the civil and structural components of the works.
viii. Inspection and quality control plan.
ix. A clear description of the responsibilities of the Contractor's personnel involved with the works, including (where applicable) his Project Manager, Site Quality Manager, Site Engineer, Health and Safety Manager, Technical Office Manager, Production Manager, Supervisor, Environmental Officer, Fabricator, Erection Engineer, Shop detailer, Transporter and other personnel required for the civil and structural works.
x. Construction sequencing considerations which take into account the constraints as indicated in this Works Information.
xi. An investigation into the possibility of carrying out work prior to the outage or post outage, if applicable. This investigation clearly defines all activities which can be carried out prior to outage

(if any) and is reflected accordingly in the Construction Programme, [refer to section where requirements for construction program are provided].

xii. A Concrete Works Method Statement which describes the following as a minimum:

- Concrete sourcing.
- Testing facilities.
- Testing procedures.
- Concrete placing and curing.

xiii. A Steelworks Method Statement (where applicable) which describes the following as a minimum:

- Corrosion protection and painting.
- Method of fabrication and erection.
- The physical location of manufacturing and fabrication.
- Erection procedures which includes considerations for modularisation and construction sequencing, including a lifting and rigging plan.
- Welding procedures that the *Contractor* plans to use.
- Steel transportation.

xiv. An Earthworks Method Statement which describes the following as a minimum:

- Excavation procedure.

xv. The *Contractor* submits a new Construction Work Method Statement, a month prior to commencing with any construction activities and after Contract Award, which covers all the aspects listed above and any additional requirements or changes arising from negotiations or clarifications, for acceptance by the *Project Manager*. This Method Statement is to include interfaces with Others. This new method statement includes a sequential erection procedure which clearly shows detailed consideration for stability requirements of the structure (if applicable) at all stages during erection and a constructability analysis which includes the following:

- An analysis of the access to Site.
- An analysis of the crane usage requirements, crane locations and possible congestion to traffic.
- An analysis of the excavations and construction activities required by Others and associated possible impacts on the delivery of the *works.*

5.5 TEMPORARY WORKS, SITE SERVICES & CONSTRUCTION CONSTRAINTS

5.5.1 Employer's Site entry and security control, permits, and Site regulations.

The *Contractor* complies with the *Employer's* procedure for Application of Security Access Control at Arnot Power Station.

5.5.2 Restrictions to access on Site, roads, walkways and barricades.

All areas which are accessible to Others, including other *Contractor*'s or the *Employer's* personnel. Or which is adjacent to public roads or thoroughfares, or whereby the safety of persons may be endangered must be barricaded using hard barricading such as scaffolding or prefabricated screens.

5.5.3 People restrictions on Site; hours of work, conduct and records

The *Contractor* keeps records of his People, Equipment, Plant, Material, progress reports including those of his Subcontractors which the *Project Manager* or *Supervisor* have access to at any time. These records may be needed when assessing compensation events.

5.5.4 Health and safety facilities on Site

Medical Facilities

i. The Contractor provides a First Aid service to his employees and subcontractors. In the case where these prove to be inadequate, like in the event of a serious injury, the *Employer's* Medical Centre and facilities will be available at a fee.

ii. Outside the *Employer's* office hours, the Employer's First Aid Services are only available for serious injuries and life-threatening situations.

iii. The *Employer* recovers the costs incurred, in the use of the above Employer's facilities, from the Contractor.

5.5.5 Contractor's Equipment

Whatever title the *Contractor* has to Equipment, Plant and Material passes to the *Employer* if it has been brought within the Working Areas. The title to Equipment, Plant and Material passes back to *the Contractor* if it is removed from the Working Areas with the *Project Manager's* permission.

The *Contractor* removes Equipment from the Site when it is no longer needed unless the *Project Manager* allows it to be in the *works.*

5.5.6 Equipment provided by the Employer.

The *Employer* provides the *Contractor* scaffolding and barricading where necessary to carry out the *works* as set out in Works Information.

5.6 SITE SERVICES AND FACILITIES

Refer to 32-727, Eskom Safety, Health, Environment and Quality (SHEQ) Policy. All services and facilities that are not specifically stated to be provided by the *Employer* and which are necessary for the *Contractor* to Provide the Works, are provided by the *Contractor*.

5.6.1 Water supply for construction purposes

The *Contractor* connects to the nearest available water supply point as indicated by the *Project Manager*. The *Employer* supplies, free of charge, reasonable quantities of potable water required for the

purpose of this contract from the existing points. The *Contractor* provides, at his own cost, all connection fittings, pipe work, temporary plumbing, and pumps necessary to lead the water from the *Employer's* points of supply to the various points where it is required.

5.6.2 Power supply for construction purposes

The *Contractor* connects to the nearest available power supply point as indicated by the *Project Manager.* The *Contractor* takes the following into consideration:

i. The Contractor provides his own portable 380V electrical distribution boards, and supply cables to and from the boards, for all his power supply requirements to execute the works.
ii. Contractors' Electrical Distribution Boards complies with OHSA as referred to in the Electrical Installation Regulations and the Electrical Machinery Regulations.
iii. Each board brought onto site has a Certificate of Compliance issued by an accredited person.
iv. The Contractors' electrical distribution boards are installed at the works on a time negotiated with the Supervisor, prior to the possession date.
v. The Employer connects distribution boards to a 380V three-phase AC power supply, where available, only after the Contractor has submitted the valid Certificate of Compliance.
vi. All Contractors' Electrical Distribution Boards are earthed to the steel structure of the plant.
vii. The Project Manager connects distribution boards to a 380V three-phase AC power supply, only after the Contractor has submitted the valid Certificate of Compliance.
viii. All Contractors' Electrical Distribution Boards are earthed to the steel structure of the plant.

5.6.3 Telephone/internet facilities

The *Contractor* is responsible for arranging his own telephone/internet facilities.

5.6.4 Ablution facilities

Ablution facilities are available on some areas on site. In areas where the facilities are far from the *Contractor's* working area the *Contractor* makes the necessary arrangement to provide ablution facilities. Chemical serviced toilets are the minimum acceptable standard and maintained in a clean and sanitary condition.

5.6.5 Storage facilities

The *Contractor* is to make his own arrangements regarding storage facilities and laydown areas that are required to complete the *works.* All laydown areas on Site are as per agreement with the *Project Manager.* All storage facilities (Plant, Material and Equipment) will be within the boundaries of the Site in order not to affect the operations of Others.

5.6.6 Facilities provided by the *Contractor.*

It is required, for the proper co-ordination and execution of the *works,* that the *Contractor* has an office on Site for the duration of the contract.

The *Contractor* includes in his establishment rates for all further treatment of the *Contractor's* yard areas that he considers necessary for his entire operation throughout his period of occupation and under all weather conditions including SANAS approved bulk mixing plants, laboratories etc. The *Contractor* also includes for all security fencing, security, and access arrangements. The yard is kept clean and tidy at all times, this requirement extends to all workshops and storage areas under the control of the *Contractor.* Maintenance of the yard is the *Contractors* responsibility and is for the *Project Managers* acceptance.

Outfall drainage of all surface run-off drains is constructed by the *Contractor* to the acceptance of the *Project Manager* to minimise erosion and to effect control of contaminated water. The *Contractor's* plan for the layout of his yard area are accepted by the *Project Manager* prior to occupying the yard and the *Contractor* does not occupy any site area other than that allocated to him. The *Contractor's* plan states fully what measures are taken regarding removal and storage of topsoil, stabilisation of eroded areas and further loss of topsoil.

The *Contractor* complies with the *Employer's* standard: 32-727, Eskom Safety, Health, Environment and Quality (SHEQ) Policy.

The *Contractor* provides, erects and maintains for his own use adequate size office accommodation and stores together with drainage, lighting, heating, and hot and cold-water services as may be required. The *Contractor* makes provision for adequate parking and a turning area adjacent to all the aforementioned structures. The *Project Manager,* prior to commencement of any work on Site, accepts all designs and layouts for these provisions.

The *Contractor* dismantles and clears the yard of all temporary structures with associated foundations and infrastructure at the direction of the *Project Manager* on Completion of the *works.* No dismantling and clearance work is carried out without prior acceptance from the *Project Manager*.

The *Contractor* dismantles and clears the yard of all such temporary structures and associated foundations and infrastructure at the direction of the *Supervisor* on Completion of the whole of the works. No such dismantling and clearance work is carried out without prior acceptance from the *Supervisor*.

5.7 DAMAGE TO COMPONENTS NOT FORMING PART OF THE *WORKS*

The *Contractor* takes the utmost care to prevent damage to existing infrastructure and equipment. The *Contractor* therefore plans the *works* considering any existing infrastructure and equipment.

Any damages resulting from the *works* is repaired/made good by the *Contractor* at his own expense, to the satisfaction of the *Employer.* The *Contractor* supplies a method statement for the repair works to the *Employer* for review and acceptance prior to conducting the repair works.

The *Contractor* may require removing some equipment and structural steel/ concrete structures to facilitate the *works.* In such case, the *Contractor* submits a list of existing equipment/ structural steel/ concrete structures that requires removal in a method statement for the *Project Manager's* review and acceptance. The cost of removal of undamaged components, preservation and replacement to its original working state is the responsibility of the *Contractor.*

5.8 TITLE TO MATERIALS FROM DEMOLITION AND EXCAVATION

The *Contractor* is responsible for disposal of all the waste generated from the *works* in an environmentally friendly manner, ensuring that hazardous (contaminated rubble) and general waste are

disposed of at a nearest registered landfill site in accordance with 32-245, *Eskom Waste Management Standard.* The *Project Manager* is notified of the disposal site before any disposal can be done. For all scrap metal, cables and material the *Contractor* submits with the tender the price per tonne for disposal of such material. In case of salvaged equipment, identified by the *Project Manager,* the *Contractor* is expected to safely remove such equipment and store it at the designated site as identified by the *Project Manager*. The list of all salvaged equipment is to be issued to the *Contractor* before the start of the *works*.

5.9 BILL OF QUANTITIES

The *Contractor* compiles a Bill of Quantities, which accounts for each aspect/component of the *works*.

5.10 DATA BOOKS

The *Contractor* submits signed off Data Books to the *Supervisor* for his acceptance. Data books include the following, as a minimum (where applicable):

ix. Document List.
x. Instruction for Work/ Purchase Order.
xi. Approved ITP's, QCP's;
xii. Method statements and specifications adhered to.
xiii. Rigging studies.
xiv. Risk assessments2.
xv. Approved Drawings.
xvi. Fabrication Drawings.
xvii. Material Certificates.
xviii. Weld Map.
xix. Weld Matrix Sheet.
xx. Weld Sequence.
xxi. Welding Consumables Certificates.
xxii. Welding Procedure.
xxiii. Welders' Qualifications.
xxiv. Contractor's ISO 3834 certificate.
xxv. ESKOM approved NDT Contractor.
xxvi. Approved NDT procedure.
xxvii. NDT Technician Qualifications.
xxviii. NDT Reports/ Results.
xxix. Certificate of Manufacture.
xxx. Inspection Reports.
xxxi. Corrosion Protection Consumables Certificates.
xxxii. Calibration Certificates.

xxxiii. Notifications.

xxxiv. Modifications.

xxxv. Concessions.

xxxvi. Technical Queries, Engineering Responses and communications with Project Manager/ Employer.

xxxvii. Non-conformance reports.

xxxviii. Internal Release Notes.

xxxix. Transport notifications.

xl. Calculations for any temporary works that may be required for the safe execution of the works.

xli. Concrete 7 day and 28-day cube test results.

xlii. Slump test results.

xliii. Concrete mix designs including all required test results e.g., aggregate test results.

xliv. Steel grade certificates; and

xlv. Pre-concrete and post concrete surveys.

5.11 EXCAVATIONS

No excavations are permitted without an excavation permit obtained from the Project Manager. The *Contractor* complies with the requirements of the Construction Regulations. Excavations are performed such that it imposes a minimum restriction on access to Site for Others. Excavation permits are only issued if the area has been scanned by the *Contractor,* to ensure that there are no underground services in the area to be excavated. Refer to 32-727, Eskom Safety, Health, Environment and Quality (SHEQ) Policy.

5.12 CONSTRUCTION AND ERECTION

1. The *Contractor* is responsible for the rehabilitation and construction of all associated items in accordance with the detailed drawings and specifications.
2. The *Contractor* disposes of all demolition waste at a licenced waste disposal site to be accepted by the *Project Manager*. The waste disposal site is selected to suit the classification of the materials to be disposed of. Certificates of disposal are required to be submitted to the *Employer*.

5.13 VENDOR DOCUMENT SUBMISSION SCHEDULE

Item/Activity	**Phase of returnable**
List of traceable references of previously successfully completed contracts (3 projects in the last 10 years)	Tender Returnable
High level method statement showing understanding of the scope	Tender Returnable
CV's of key personnel including supporting certification (Design Engineers, Construction	Tender Returnable

Item/Activity	**Phase of returnable**
Manager, Site Engineer)	
General Construction Work Method Statement	Tender Returnable
Constructability Analysis	Tender Returnable
Construction Programme	Tender Returnable
Constructability Analysis	After completion of detailed design
Construction Programme	Final program after contract award
Detailed Method statements, incl.: • Site clearance • Earthworks • Safeguarding slopes • Preparation of engineered fill method statement	28 days before Construction
Concrete method statements, incl: • Curing of concrete and thermal protection for "massive" concrete • Sequence of construction & placing of construction joints • Transport, placing and compaction of concrete • Flooring tolerances • Preparation of foundations method statement	28 days before Construction
Steelworks method statements, incl: Method statement for erection Method statement for corrosion protection	28 days before Construction
Details/ Data Sheets of penetration in brick work, concrete, steel cladding, open grid flooring etc.	28 days before Construction
Concrete 7- & 28-day cube test results	2 days after testing
Slump test results	Upon completion of test
Aggregate test results	Upon completion of test
Concrete mix design	14 days before Construction
Structural (mill certificates) & Reinforcing Steel grade certificates	14 days before Construction
High Strength Bolts Material Certification	14 days before Construction
Welding procedure specifications	14 days before Fabrication
Weld test certificates	7 days after Construction
NDT testing results	2 days after testing
Inspection and Test Plans	28 days before Construction
Fabrication Drawings	28 days before Construction

Item/Activity	Phase of returnable
Temporary Works Designs	35 days before Construction
Rigging Studies	28 days before Construction
As-built drawings (In .dwg & .pdf format)	14 days after Construction
Data Books	28 days after Construction

6. REVISIONS

Date	Rev.	Compiler	Remarks
12 October 2023	0	M Nkgapele	First Draft issued for Review/LDE inputs
05 March 2024	0.1	M Nkgapele	Final document

7. APPENDIX A

Table 7-1: Civil / Structural National/international Standards

Civil / Structural Standards		
No	**Document No**	**Description / Title**
1	SANS 10021:2012	The water-proofing of buildings (including damp proofing and vapour barrier installation).
2	SANS 10100-1:2000	The structural use of concrete Part 1: Design.
3	SANS 10100-2:1992	The structural use of concrete Part 2: Materials and the execution of work.
4	SANS 10144:1995	Detailing of reinforcement for concrete.
5	SANS 10160:2011	Basis of structural design and actions for buildings and industrial structures Parts 1-8.
6	SANS 10161:1980	The design of foundations for buildings.
7	SANS 10162-1:2011	The structural use of steel Part 1: Limit state design of hot-rolled steelwork.
8	SANS 10162-2:2011	The structural use of steel Part 2: Limit state design of cold-formed steelwork.
9	SANS 10162-4:1997	The structural use of steel Part 4: The design of cold formed stainless steel structural members
10	SANS 10164-1:1980	The structural use of masonry Part 1: Unreinforced masonry walling.
11	SANS 10164-2:2008	The structural use of masonry Part 2: Structural design and requirements for reinforced and pre-stressed masonry.
12	SANS 1921-3	Construction and management requirements for works contracts, Part 3: Structural steelwork
13	SANS 10160	Loading Code
14	TRH14: 1985	Guidelines for Road Construction Materials

Table 7-2: Structural National/International Standards

Structural Standards		
No	**Code**	**Description**
1	AWS D1.1	Structural welding code – steel
2	SANS 1921-3	Construction and management requirements for works contracts, Part 3: Structural steelwork
3	SANS 1431	Wieldable structural steels
4	SANS 50025-2	Hot rolled products of structural steels – Part 2- Technical delivery conditions for non-alloy structural steels
5	SANS 1700 SET	Fasteners
6	SANS 10162	The structural use of steel
7	SANS 2001-CS1	Construction works Part CS1 : Structural steelwork
8	BS EN 10210-2	Hot Finished Structural Hollow Sections of Non-Alloy and Fine Grain Structural Steels
9	SANS 2001-CC1	Construction works Part CC1 : Concrete
10	SANS 2001-CS1	Construction works Part CS1 : Structural steelwork
11	SANS 121	Hot Dip Galvanized Coatings

Table 7-3: Electrical National Standards

Electrical National Standards		
No	**Document No**	**Description / Title**
1	SANS 10142-1	The wiring of premises - Part 1 - Low Voltage Installations
2	SANS 60529	Degrees of protection provided by enclosures (IP Code)
3	SANS 60050-441	International electrotechnical vocabulary Chapter 441: Switchgear, controlgear and fuses
4	SANS 1091	National Colour Standard
5	SANS 60034	Rotating Electrical Machines
6	SANS 10242-1	The rewinding and refurbishing of rotating electrical machines - Low Voltage three phase induction motors
7	SANS 1804	Induction Motors
8	SANS 60072	Dimensions and output series for Rotating Electrical Machines
9	SANS 10198	The Selection, Handling & Installation of Electric Power Cables not exceeding 33kV
10	SANS 1507	Electrical Cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1900/3300 V)
11	SANS 6284	Test Methods for Cross-Linked Polyethylene (XLPE) insulated electric cables
12	SANS 1339	Electric cables - Cross-linked polyethylene (XLPE) insulated cables for rated voltages 3.8/6.6kV to 19/33kV
13	SANS 62444	Cable glands for Electrical Installations
14	SANS 1574	Electric flexible cores, cords and cables with solid extruded dielectric insulation
15	SANS 10313	The protection of structures against lightning
16	SANS 62305-1	Protection against Lightning: Part 1: General Principles
17	SANS 62305-2	Protection against Lightning: Part 2: Risk Management
18	SANS 62305-3	Protection against Lightning: Part 3: Physical damage to structures and life hazard
19	SANS 62305-4	Protection against Lightning: Part 4: Electrical and electronic systems within structures
20	SANS 1063	Earth Rods, Couplers and Connections
21	SANS 10199	The design and installation of earth electrodes
22	SANS 10292	Earthing of low-voltage (LV) distribution systems
23	SANS61140	Protection against electric shock — Common aspects of installation and equipment
24	SANS 1973-1	Low-voltage switchgear and controlgear ASSEMBLIES - Part 1: Type-tested ASSEMBLIES with stated deviations and a rated short-circuit withstand strength above 10 kA
25	SANS 60439	Low-voltage switchgear and controlgear assemblies
26	SANS 60269	Low Voltage Fuses
27	SANS 60947	Low Voltage Switchgear and Controlgear
28	SANS 61439	Low Voltage Switchgear and Controlgear Assemblies
29	SANS 60934	Circuit-breakers for equipment (CBE)
30	SANS 475	Luminaires for interior lighting, streetlighting and floodlighting - Performance requirements
31	SANS 556	Low-voltage switchgear: Circuit-breakers
32	SANS 10098	Public lighting
33	SANS 60598	Luminaires

Electrical National Standards		
No	**Document No**	**Description / Title**
34	SANS 164	Plug and socket-outlet systems for household and similar purposes for use in South Africa
35	SANS 60884	Plugs and socket-outlets for household and similar purposes
36	SANS 767 -1	Earth leakage protection units: Fixed earth leakage protection circuit-breakers
37	SANS 10114	Interior Lighting
38	SANS 10389	Exterior Lighting
39	SANS 60662	High-pressure sodium vapour lamps
40	SANS 10400-O	The application of the National Building Regulations Part O Lighting and ventilation
41	SANS 10108	Classification of Hazard Locations
42	SANS 10119	Reduction of explosion hazards presented by electrical equipment — Segregation, ventilation and pressurization
43	SANS 60079-0	Explosive atmospheres — Part 0: Equipment — General requirements
44	SANS 60079-10-1	Explosive atmospheres Part 10-1: Classification of areas — Explosive gas atmospheres
45	SANS 60079-10-2	Explosive atmospheres Part 10-2: Classification of areas — Combustible dust atmospheres
46	SANS 60079-14	Explosive atmospheres Part 14: Electrical installations design, selection and erection
47	SANS 60079-25	Explosive atmospheres – Part 25: Intrinsically safe systems
48	SANS 1545-1	Safety rules for the construction and installation of lifts Part 1: Electric lifts WARNING
49	SANS 50081	Safety rules for the construction and installation of lifts
50	SANS 13850	Safety of machinery — Emergency stop — Principles for design
51	SANS 60204-1	Safety of machinery — Electrical equipment of machines Part 1: General requirements
52	SANS 60204-32	Safety of machinery — Electrical equipment of machines Part 32: Requirements for hoisting machines

Table 7-4: Eskom Fire System Specifications

Applicable Eskom Fire Specifications		
No	**Document No**	**Description / Title**
1	240-54937439	Fire Protection/ Detection Assessment Standard
2	240-54937450	Fire Protection & Life Safety Design Standard
3	240-56737448	Fire Detection and Life Safety Design Standard