Eskom	**Scope of Work**	**Generation**

Title: SSC Drive Gearbox Upgrade

Unique Identifier:

Alternative Reference Number: **N/A**

Area of Applicability: **Matimba Power Station**

Documentation Type: **Scope of Work**

Revision: **1**

Total Pages: **17**

Next Review Date: **N/A**

Disclosure Classification: **CONTROLLED DISCLOSURE**

Compiled by	**Supported by**	**Supported by**	**Functional Responsibility**	**Authorized by**
SM Buthelezi	**V Gabashe**	**W. Mjuqu**	**G Nkuna**	**J Mathobela**
System Engineer	C&I Engineer	Electrical Engineer	Auxiliary Engineering Manager	Engineering Manager
Date..2024/09/04	Date.2024/09/05..	Date..2024/09/05.	Date.2024/09/09..	Date.2024/09/09

PART 3: SCOPE OF WORK

Document reference	Title	No of pages
	This cover page	1
C3.1	*Employer*'s Works Information	52
	Total number of pages	53

C3.1: EMPLOYER'S WORKS INFORMATION

Contents

1 Description of the *works*

1.1 Executive overview

This document provides the Technical Specification of the Submerged Scraper Conveyor (SSC) drive replacement project at Matimba Power Station.

The purpose of this document is to state the Employer's requirements and provide the Contractor with the necessary information to submit a comprehensive tender to upgrade the SSC's drive system. The scope of this engineering change includes the removal of the SSC drives installed on all six units and replacing them with new hydraulic drive systems. This will require a plant modification of the drive system as well as the drive shaft.

The following areas of the SSC will be modified or installed:

- SSC hydraulic drive installation
- Hydraulic drive motor installation,
- Power pack cabinet installation and cabinet positioning,
- Drive shaft modification,
- Drive shaft bearings installation,
- SSC head end structural modifications for torque arm, and
- Control and Instrumentation design,
- Electrical power supply design.

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

The objectives of the works are to:

- Improve SSC availability and reliability.
- Standardize SSC drive technology to be compatible with drives installed at Kendal, Majuba, Lethabo and Tutuka Power Stations.

1.3 Interpretation and terminology

1.3.1 List of Definitions

Definition	Description
Ash	A waste product resulting from burning coal
Basic Design	In general, a process to establish an agreed basic design baseline that complies with the concept design baseline and stakeholder requirements.
Backlog recovery	An accumulation of Boiler Bottom Ash (BBA) needing to be removed from within the SSC.
Coarse ash	Ash particles formed in the boiler that is too large to be carried in the flue gases. It is usually referred to as BBA.
System	An integrated set of constituent pieces that are combined in an operational or support environment to accomplish a defined objective. These pieces include people, hardware, software, firmware, information, procedures, facilities, services and other support facets.

1.3.2 List of Abbreviations

The following abbreviations are used in this Works Information:

Abbreviation	Meaning given to the abbreviation
AFC	Approved for construction
OBL	Outside battery limits
BBA	Boiler Bottom Ash
CAC	Coarse Ash Conveyors
Cr	Chromium
C&I	Control and Instrumentation
CoE	Centre of Excellence
DCS	Distributed Control Systems
DI	Digital Input
DO	Digital Output
EDWL	Engineering Design Work Lead
EDMS	Electronic Document Management System
FAT	Factory Acceptance Testing
FMEA	Failure Mode and Effect Analysis
HV	Vickers Hardness
Hz	Hertz
IP	Ingress Protection I
SO	International Organization for Standardization
KKS	Kraftwerk Kennzeichnen System
kW	Kilowatts
LCP	Local Control Panel
LV	Low Voltage
mA	Milliamps
MCR	Maximum Continuous Rating
mm	Millimetres
Ni	Nickel
Nm	Newton Meters
PCD	Pitch Circle Diameter
PIV	Positively Infinitely Variable
PVC	Poly-Vinyl Chloride

P.S.	Power Station
SHE	Safety, Health & Environmental
SSC	Submerged Scraper Conveyor
Tph	Tonnes per hour TXP Teleperm XP
UCLF	Unplanned Capability Loss Factor
V	Volts
VDSS	Vendor Documentation Submittal Schedule

2 Management and start up.

2.1 Management meetings

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.

2.2 Documentation control

2.2.1 Documentation

All documents supplied by the Contractor shall be subject to Eskom's approval. The language of all documentation shall be in English. The Contractor shall include the Employer's drawing number in the drawing title block. This requirement only applies to design drawings developed by the Contractor and his Subcontractors. Drawing numbers will be assigned by the Employer as drawings are developed.

2.2.2 Document Identification

The Contractor is required to submit the Vendor Document Submission Schedule (VDSS) as per agreed dates to the delegated Eskom Representative. Eskom will pre-allocate document numbers on the VDSS and send back to the Contractor through the delegated Eskom Representative. The VDSS is revisable, and changes must be discussed and agreed upon by all parties. Changes in the VDSS can be additional documentation to be submitted, changes in submission dates or corrections in documentation descriptions, document numbers, etc. The Contractor's VDSS shall indicate the format of documents to be submitted.

2.2.3 Document Submission

In order to portray a consistent image, it is important that all documents used within the project follow the same standards of layout, style and formatting as described in the Work Instruction. The Contractor is

required to submit documents as electronic and hard copies and both copies must be delivered to the Employers Representative with a transmittal note.

In addition, the Contractor shall be provided with the following standards which must be adhered to:

- 240-66920003, Documentation Management Review and Handover Procedure for Gx Coal Projects.
- 240-65459834, Project Documentation Deliverable Requirement Specification.
- 240-54179170Technical Documentation Classification and Designation Standard.

Email subject:
The Contractor shall submit all documentation to the Eskom Representative as well as the Project's Documentation Centre in the following media:

- Electronic copies shall be submitted to Eskom Documentation Centre through generic email address (drmsharedservices@eskom.co.za). The email subject shall as a minimum have the following: (Project Name and Discipline Subject). Electronic copies that are too large for email will be delivered on CD/DVD, 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.

2.2.4 Engineering change management

All Design change management shall be performed in accordance with the latest revision of the Eskom Project Engineering Change Management Procedure (240-53114026) and the Employer shall ensure that the Contractor is provided with the latest revisions of this procedure. Any uncertainty regarding this procedure should be clarified with the Employer. All design reviews will be conducted according to the Design Review Procedure (240-53113685).

2.2.5 Drawing's format and layout

The creation, issuing and control of all Engineering Drawings will be in accordance with the latest revision of 240-86973501, Engineering drawing Standard. Drawings issued to the Employer will be a minimum of one hardcopy and an electronic copy. All Contractors are required to submit electronic drawings in Micro Station (DGN) format, and scanned drawings in pdf format. No drawings in TIFF, AUTOCAD or any other electronic format will be accepted. Drawings issued to the Employer may not be "Right Protected" or encrypted.

2.2.6 Plant coding and labelling

2.2.7 Plant coding

The Employers KKS Coding Manual shall be used to allocate codes to plant or system included in the Works. Plant Coding shall be undertaken by the Employer and as such the service provider shall make available the following documentation to code:

Mechanical

- Piping and Instrumentation Diagrams (P&IDs)
- Interface list
- Process flow diagrams (PFDs)

Civil and structural
- Site layouts
- Building layouts
- Building sectional layouts
- Building floor plans per level
- Underground services layouts
- Cable rack & support
- Building lists (including room equipment lists)

Electrical
- Single line diagrams
- Electrical board general arrangements (GA)
- Cable schedule

Control and Instrumentation
- C&I architecture drawings
- C&I Cubicle GA
- Cable block diagrams
- Remote control station lists
- Control and Operating Philosophy
- Functional Logic Diagrams
- Alarm and Limit Value List
- Instrument List
- Drive and Actuator List
- Cable schedules
- Instruments

The Employer will assign a coding technician who will interact with the Service Provider in coding the plant as listed above. It may be required that the person be based at the Contractor's offices full time. The Contractor will then be required to include allocated codes to all other designs and related documentation. It is also the responsibility of the Contractor to consistently apply the KKS codes throughout the rest of the technical documentation which shall include, but not limited to:

- Load schedules
- Board parts lists
- Cable block diagram
- Termination diagram
- Drive & actuator schedules
- Instrument schedules
- Alarm lists, loop diagrams
- Signal lists
- Schematic diagrams
- Termination diagrams
- Logic diagrams, etc.

The Contractor shall ensure that all documentation is coded (as per the codes assigned by the technician) prior submission to the Employer for review.

2.2.7.1 Plant Labelling

It is the responsibility of Contractor to manufacture and install KKS coded equipment's labels. Labels are manufactured and installed according to Matimba P.S. KKS Plant Labelling Guideline (240-62937990). The Employer will label all KKS coded equipment. The Coding Technician shall facilitate base lining of all equipment lists, and only baseline equipment lists shall be used as a basis for the production of labels.

The Abbreviation Standard for Labelling of Plant at Power Coding and labelling of components inside electrical and C&I panels shall be done by the Contractor.

2.3 Health and safety risk management

2.3.1 General

The Contractor complies with the following:

- Matimba Power Station Health and Safety Standards as per Matimba Power Station Health & Safety Specifications for Contractors (PA/270/003) attached to the Invitation to Tender. This procedure will be handed over during tender enquiry and will enable the successful Tenderers to compile a Health & Safety plan that has to be approved by the Employer prior to commencement of work.
- Compliance with Eskom & Matimba No Smoking Policy
- Adhere to the OHS Act 85 of 1993
- All staff will undergo Safety Induction, presented by Matimba Risk Management Department

Employer's site regulations as stipulated in Form PA/270/003, covering the following:

- Clean lines
- Storage of material
- Safety precautions and fire prevention
- Permits to work
- Other Contractor's work
- Representation of sub-Contractors
- Maintenance staff to witness erection
- Supervision
- Handing over of works
- Contractor's Site

2.3.2 Matimba Permit to Work System

The Contractor will ensure that he/she is informed of all the requirements of Eskom's Plant Safety Regulations and ORHVS and that he/she at all times comply to the requirements of these Regulations.

The Contractor will ensure that all his supervisors who are directly involved with Eskom's Permit to Work System, are trained and on successful completion of Matimba's authorization / evaluation process will be authorized as "Responsible Persons".

The Responsible Person shall ensure that:

- The conditions of permits and cautionary notices are strictly adhered to

- The lockout procedures, mechanical as well as electrical, are strictly adhered to and any deviations shall be corrected immediately
- The safe work procedures as laid down by Matimba Power Station and as determined by the Risk Assessment, shall be followed
- The workers register and cautionary notices are discussed daily with workers

2.3.3 SHE documentation required from the Contractor at tender

The Contractor shall provide the following documents in terms of Health, Safety and Environmental performance, should the Contractor not provide this information it will be assumed that it does not exist:

2.3.3.1 Health and Safety Plan (Construction Regulations)

The following will be required after contract award:

The Contractor shall compile a Health and Safety Plan, filed in a Health and Safety File. Healthy and safety file should be compiled in line with attached healthy and safety file guideline index.

2.3.3.2 Occupational Health and Safety Act 1993, Section 37

The Contractor shall comply with the following:

- The Occupational Health and Safety Act, 1993, and all Regulations made there under.
- All Employer Safety and Operating Procedures, which are attached hereto.
- The Contractor acknowledges that he is fully aware of the requirements of all the above and undertakes to employ only people who have been duly authorized in terms thereof and who have received sufficient safety training to ensure that they can comply therewith.
- The Contractor undertakes not to do, or not to allow anything to be done which will contravene any of the provisions of the Act, Regulations or Safety and Operating Procedures.
- The Contractor shall appoint a person who will liaise with the Employer Safety Officer responsible for the premises relevant to this contract.
- The person so appointed shall on request:
- Supply the Employer Safety Officer with copies of minutes of all Health and Safety Committee meetings, whenever he is required to do so.
- Supply the Employer Safety Officer with copies of all appointments in respect of Employees employed on this contract, in terms of the Act and Regulations and shall advise the Safety Officer of any changes thereto.

Employer may, at any stage during the currency of this agreement be entitled to:

- Do safety audits at the Contractor's premises, its workplaces and on its Employees.
- Refuse any Employees, sub-Contractor or agent of the Contractor access to its premises if such person is found to commit any unlawful act or any unsafe working practice or is found to be not authorized or qualified in terms of the Act.
- Issue the Contractor with a work stop order or a compliance order should Employer become aware of any unsafe working procedures or conditions or any non-compliance with the Act, Regulations and Procedures by the Contractor or any of its Employees, sub- Contractors or agents. Stoppages of this nature will not constitute a compensation event.

2.3.4 Housekeeping

Working areas are cleaned daily. All electrical cables and hoses are routed so as not to cross over floors and walkways. All equipment is packed neatly without interference to access. All excess scaffolding material is removed from working areas after the scaffolding has been erected. Scrap bins are available on the zero-meter level and emptied daily by the Employer.

2.3.5 Barricading

Access to danger zones is done using handrail type guards of at least 1,2 meters high, able to block access to the danger zone. Symbolic safety signs depicting “Danger” and “No entry” are attached to the guards.

2.3.6 Scaffolding

Scaffolding must be erected and only be used once authorized by the competent person that it is safe for use.

2.3.7 Hazardous Waste

All waste introduced to and/or produced on Employer's Premises by the Contractor for this order, must be handled in accordance with the minimum requirements for the Handling and Disposal of hazardous waste in terms of Government Legislation as proclaimed by the Department of Water Affairs and Forestry 1994 Ref.: BN0621-16296-5. (A copy of this document is available at the Power Station for reference purposes).

2.4 Environmental constraints and management

Matimba has an Environmental Policy, PP/240/001, to which the Contractor and his employees must adhere. It is the responsibility of the Contractor to ensure that he obtains copies of the Matimba Environmental Policy, the legal register applicable to his area of responsibility, the aspect register and the Matimba procedures (applicable to the Contractor's area of responsibility) and to familiarize themselves on such procedures, within 30 days from the date of commencement of work at Matimba, to assist the Contractor and his/her employees to prevent pollution and to comply with legislative requirements. Copies of the above-mentioned documents shall be obtained from the Project Manager or Environmental Officer on the first day prior to commencement of work at Matimba. The Contractor shall submit proof to the Environmental Officer of Matimba that he and his employees has done all the necessary training on procedures and Policies supplied to them and that they do understand the contents of the procedures, registers and policies and will adhere to them at all times.

The Contractor adheres to the following rules:

- Provide sufficient storage containers, labelled depicting general or hazardous waste and store in a designated storage area
- No hazardous waste may be stored for a period of more than 90 days on the Matimba premises
- Ensure that all hazardous waste is disposed off at a licensed Class H disposal site. A copy of the hazardous waste disposal certificate is submitted to the Project Manager.
- Ensure that all other general waste is disposed off at the local municipal waste dump
- Ensure that the Contractor's site does comply with the general good housekeeping practices. Redundant materials are moved to allocated sites. No scrap shall be stored in the Contractor's yard. Scrap is to be cleared from Site daily.
- The non-adherence to the Matimba Environmental policy and rules could result in the termination of this contract.

2.5 Quality assurance requirements

2.5.1 Quality Management System

The Contractor shall implement and maintain a quality management system that as a minimum meets the requirements of Generation Standard GGS 0462 Quality Management for Engineering and Construction Works. If the Contractor is registered, the appropriate ISO 9001:2000 Registration certificate of compliance must be supplied with the tender.

The Contractor further ensures that the subcontractor's programmes comply with the requirements of the Works Information. The Contractor notifies the Project Manager of any changes to the Quality System and obtains agreement prior to implementation on existing orders and contracts, or sub orders and subcontracts.

2.5.2 Quality Documents Submitted with the Tender

The Contractor submits a copy of his quality policy and quality system procedures relevant to the Works. The Contractor also submits a typical quality control plan.

The Project Manager evaluates the Contractor's capabilities with regards to quality assurance and quality control based on these submissions and the performance history of the Contractor. The Project Manager performs pre-award assessments where necessary, giving further information to aid the selection process.

2.5.3 Quality Documents Submitted after the Contract Date

Contractor submits a fully detailed Quality Assurance Programme (QAP) for acceptance by the Project Manager within four weeks of the Contract Date.

The documents submitted by the Contractor shall include the following:

- Copy of the Quality Manual
- Copy of the Quality System Procedure
- Copy of the Contract Quality Management Plan
- Copy of Quality Control Plans
- Copy of the proposed index of the QA/QC, inspection and test records
- The Contractor will further submit the following documents during the course of the contract:
- Non-conformance reports (NCR's) raised by the Contractor
- Notification of any planned changes to the Contractor's quality manual, quality system procedures, contract quality management plan or quality plan for acceptance by the Project Manager prior to implementation
- Concession/production permit applications and supporting documentation
- Data books and/or data packages

2.5.4 Contract Quality Management Plan Requirement

The Contractor prepares a contract quality management plan that, where appropriate, indicates the following:

- Indicates the interface with the Contractors quality system and applicable documents such as procedures and work instructions
- Establishes communication channels between the Contractor and the Project Manager in respect of quality and the integration of such with prescribed contract communication channels
- Indicates how specific subcontractors will be monitored

- Identifies items or activities for which quality control plans will be prepared
- Identifies the specifications, drawings and acceptance criteria for material for which quality control plans are not required
- Identifies the areas or processes requiring special controls
- Identifies the Contractor's Management Representative and personnel responsible for the control of quality activities and their relationship to the Contractor's management structure
- Identifies the documents which are to be submitted to the Project Manager
- Identifies the Contractor's quality monitoring programme

The Contractor periodically updates the contract quality management plan to reflect changes in any of the above details. The frequency of such updates is determined by the Project Manager but will not be greater than one year.

2.5.5 Quality Control Plan

The Contractor quality control plans cover inspection and test proposals for items or activities to be supplied as part of the works.
The quality control plan indicates the following as appropriate:

- The identification of the item
- The material
- A list of the sequence of operations including inspections and tests
- The identification of the specification, drawings or procedures for each operation
- The acceptance criteria with reference to the appropriate technical specification, in-house, national or international standard and relevant clause number
- The inspections and tests the Contractor has nominated for hold and witness points
- Provision for inspections and tests nominated by the Project Manager
- Provision for inspection status indication
- Inspection and test records that are generated by the Contractor

The quality control plans are reviewed by the Project Manager to allow for insertion of his specific requirements, including hold and witness points, prior to commencement of work. The Contractor does not commence work until the Project Manager accepts.

2.5.6 Access to the Contractor's and Subcontractor(s) Premises and Facilities

The Contractor and/or its subcontractor gives access to the Supervisor and/or the Authority/Agency and the Regulator where appropriate to their premises and facilities at reasonable times to conduct quality assessments, audits, surveillances and inspections to establish compliance with the contractual requirements.

2.5.7 Inspection and Testing

The Contractor gives at least 72 hours advance notification to the Supervisor or the Authority for inspection/test and hold or witness points, which require their attendance. The Contractor confirms readiness for inspection at least 24 hours prior to the test.

The Contractor ensures that all work has been fully inspected, accepted and documented prior to requesting any inspection by the Supervisor.

2.5.8 Quality Records

The Contractor prepares and submits to the Project Manager an Index of QA/QC and inspection and test records prior to the commencement of work.

The Project Manager determines which documents are to be submitted during the performance of work and reviews the index and request changes if required. The Contractor conforms to the Index approved by the Project Manager.

The Contractor ensures all records identify the items, equipment and/or activities to which they pertain and collates indexes and securely stores the records in such a manner that they are readily retrievable.

The Contractor implements appropriate administrative controls to limit access to prevent inadvertent loss of or damage to records.

The Contractor stores all quality records. The Contractor only destroys or discards quality records with the approval of the Project Manager.

The Contractor presents on completion of the works all quality records in the form of a data package. The package is indexed and shows the entire contents.

2.6 Programming constraints

2.6.1 Purpose

The purpose of the program and planning is to define the Employers requirements for the time, cost and resource planning and control when using the NEC contract.

2.6.2 General

- **Definition of Plans**

"Plans to be submitted" is defined as the collective submission of a programme, forecast rate of payment (FRP) schedule and resource schedule.

- **Contractor's Skilled Staff**

The Contractor makes available, for the duration of the contract, skilled planning personnel to work with and liaise with the Project Manager as required.

- **The Costs of Project Planning and Progress Monitoring**

The cost of complying with the requirements of this standard is entered in the appropriate Activity Schedule.

- **Contractual Dates Supplied by the Project Manager (key dates)**

All contractual and outage dates are integrated into the Contractor's programme. These dates only change when an extension of time is granted by the Project Manager.

- **One Plan to be submitted**

The Contractor submits only one programme, which incorporates the programmes of all of his sub-contractors. The interface points between his different subcontractors, as well as the interface points between the individual subcontractor's works and the Contractor's works are clearly indicated. Project Key Milestones as supplied by the Project Manager, are incorporated into the programme as per the NEC Core Clause 31.2. Likewise, the Project Manager only accepts one forecast rate of invoicing and resource schedule.

- **Time Analysis**

Should the Contractor require to reserve built in float to control subcontractors, shipping facilities and transport, such float is shown as an activity named "project float" thus eliminating unrealistically long activity durations.

The total "float" or "slack" of an activity is defined as the difference between the earliest completion and the latest completion dates of the activity. Automatic manipulation of "lags", "overlaps", "leads", "relations" or "dummies" (with positive, zero or negative duration's) to cause the float to remain constant when updates are performed is not acceptable.

- **Planning Networks**

The programme network has no fewer activities than the technical and commercial breakdowns listed in the Activity schedules.

Networks are constructed to reflect the possible (instead of probable) sequences of activities, using resource scheduling to stagger the performance of activities into the most probable sequence.

A single time estimate for the duration of an activity is given assuming “normal” resources are available as required. The activity duration is estimated in working days. The calendar(s) used are based on normal working hours per day and working and working days per week. Any changes to this are to be approved by the Project Manager.

- **Time Reporting**

The method for reporting on activities in progress is by remaining duration, i.e., the time, in working days, needed to complete the activity from the report date. Once an activity has started, the remaining duration is assessed for each update.

Automatic reduction of remaining duration as the report date moves forward is not accepted.

- **Actual Dates**

When completion of any activity is confirmed by quoting document numbers, these numbers are given in a remark’s appendix, e.g., suborders, drawings, inspection certificates, delivery notes, etc. The actual start and completion dates of all activities are reported on.

- **Removal of completed activities**

Once their completion has been recorded, completed activities are removed from progress reports, although full reports may be requested.

- **Plans to be submitted**

At the time period stated in the Contract Data, the Contractor submits his programme for the Project Manager’s acceptance.

A summary programme (Hammock) is provided where the summarised activities including the possession dates, and major interfaces of services and or other contracts logically required for the completion of the contract are clearly shown.

- **Forecast Rate of Payment**

The forecast rate of payment schedule, linking the values of completed activities as per the Accepted Programme, indicates (at base date values) the following:

The expected value of monthly invoicing from the starting date to the completion date including a statement of all payments made by the Employer.

Separating the following price categories:

1. Each primary option
2. Each secondary option
3. Each statutory charge whether included or excluded from the total of the prices.
4. VAT

The project values do not reflect retention or price adjustment for inflation.
The values are at base date and in every way relate to the Accepted Programme, the resources to be applied and the level of the activity schedule.

- **Resource Schedule(s)**

Resource information for manpower, Plant and Equipment based on the Accepted Programme and reflected in resource histograms is provided.

- **Detailed Workshop Manufacturing Programmes**

The Project Manager may request detailed workshop manufacturing bar charts which fit into the logic and time span of the Accepted Programme and reflects the required manufacturing completion dates.

- **Progress Reporting**

Progress reports are submitted monthly within two weeks of the date in the programme to which the Contractor is reporting his progress (time now date). The “Time Now Date”, unless otherwise agreed between the Project Manager and the Contractor, is the last day of any given month.

The Contractor submits, together with the progress reports, a written report which contains the following:

1. Statement and report on those sections of the works where delay against programme has occurred (if any), together with the reasons why delay has occurred and a plan denoting the action to be taken and the period of time necessary to recover such delay.

2. Statement and report on those sections of the works that are currently ahead of programme (if any).

3. The impact of any programming changes arising is reflected in revised forecast rate of payment schedules and resource schedules.

- **General Planning Report**

This is a comprehensive report on all the activities included in the contract programme covering the network logic, actual performance on past activities, time analysis and expected performance for future activities.
Should the logic, duration’s, “lags”, etc., be updated, such changes are listed, flagged or highlighted so that changes are readily analysed by the Project Manager.

- **Critical Activities Report**

The same format as for the general planning report is used. In this instance, however, only activities with negative float are shown. Activities are listed in ascending order of negative float.
Note: The requirements of progress reporting (a) are submitted with this report.

- **Key Event Report (key dates)**

All key events are shown. These represent the contractual dates of possession, completion, time periods for information submissions and key dates supplied by the Project Manager or Contractor as identified in the relevant schedules forming part of the contract documents.

The milestones and key date activities listed below are included in the Accepted Programmes.

- **Overseas Manufacturing Report**

This report covers all the latest programme ex-works dates for materials, plant and equipment manufactured in foreign countries and is used by the Employer's London office to report progress to the Project Manager.

2.6.3 Updated Bar Chart

If the Contractor submits progress information in the form of an updated bar chart, the latest information available is used.

Note: In all cases, submission of documentation is subject to the Project Manager's acceptance.

2.6.4 Plant Outages

The Contractor ensures that all preparatory work is carried out prior to the outage to minimize the downtime of the unit. Outage work occurs on a 24-hour basis and the actual outage may be announced at short notice. The Contractor makes provisions for the above on or near the dates as requested in the accepted program.

2.6.5 Site Programme Updating and Monitoring During Outages

The outage planning is done by the Employers Outage Planning Officer and the Contractor's planners must liaise with the Outage Planner on an ongoing basis to ensure interfacing with all other parties, so that targets are maintained and to improve the activity logic sequence as may be required.
During Outages the Contractor's programme is updated three times a week on Mondays, Wednesdays and Fridays and all feedback is required by 07H30 on those days. During outages, all necessary reports for monitoring of progress and critical path activities are available for progress meetings, which are held on Mondays and Thursdays at 13H00. All the Contractor's site managers, maintenance delegated staff, engineering staff, project staff and outage management staff attend this meeting.

Issues for discussion are as follows:

- Progress
- Co-ordinating
- Quality issues
- Milestone / targets
- Review
- Permits
- Safety / housekeeping
- General

Note: The meeting is chaired by the Project Manager.

Outage meetings are held daily at 08H00 during outages and must be attended by the Contractor to review previous days' activities and plan details and progress for the next period. An attendance registers and minutes are kept monitoring attendance and details discussed during these meetings. The Contractor's senior staff and supervisors attend these meetings with input from their staff to enable up to date feedback to the Outage Manager.

2.6.6 Contractor's Management, Supervision and Key People

The contractor must submit organogram of the project team with clear reporting lines from the lowest to the highest level of the structure.

Lines of authority / communication should be clearly indicated. Key people and decision makers should be indicated.

2.7 Invoicing and payment

Within one week of receiving a payment certificate from the Service Manager in terms of core clause 51.1, the Contractor provides the Employer with a tax invoice showing the amount due for payment equal to that stated in the Service Manager's payment certificate.

The Contractor shall address the tax invoice to:
Matimba Power Station, P.O Box 215, Lephalale, 0555 and include on each invoice the following information:

- Name and address of the Contractor and the Service Manager.
- The contract number and title.
- Contractor's VAT registration number.
- The Employer's VAT registration number 4740101508.
- Description of service provided for each item invoiced based on the Price List.
- Total amount invoiced excluding VAT, the VAT and the invoiced amount including VAT.

After each and every assessment the contractor needs to compile the invoice, original copy must be submitted to Account Payables in Matimba P/S and the copy must be submitted to the Project Manager for payment purposes.

All invoices should be submitted by 25th of every month for payments in local currency (ZAR), commercial invoices for payments in foreign current should be submitted by 19th every month.
Invoices can be handed in or submitted electronically.

2.8 Insurance provided by the *Employer.*

As per NEC insurance cover clause 80.1

2.9 Contract change management.

Any change to the contract changes management should be discussed and be approved by the employers Project Manager.

2.10 Provision of bonds and guarantees.

The form in which a bond or guarantee required by the conditions of contract (if any) is to be provided by the Contractor is given in Part 1 Agreements and Contract Data, document C1.3, Sureties.

The Employer may withhold payment of amounts due to the Contractor until the bond or guarantee required in terms of this contract has been received and accepted by the person notified to the Contractor by the Project

Manager to receive and accept such bond or guarantee. Such withholding of payment due to the Contractor does not affect the Employer's right to termination stated in this contract.

2.11 Training workshops and technology transfer

2.11.1 General

The Contractor provides training on the equipment and systems included as part of the works to the various categories of the Employer's technical staff for the duration of the works.

Training provided by the Contractor is directly applicable to the actual equipment supplied for the Works. Generalised training based on similar equipment is not acceptable. All training will consist of both theoretical and practical training. The training is to be structured such that competency tests are done at the end of the training sessions on all the training participants.

Training is scheduled such that two full scope training courses are provided at the start of the project after the commissioning of the first unit and at the end of the commissioning of the last unit.

2.11.2 Training Categories

The Contractor will provide the following basic training that will include the following as a minimum

- Familiarization with documentation including drawings and procedures
- Installation, commissioning and maintenance of all hydraulic drive components forming part of the works

2.11.3 Training Documentation

The Contractor provides all course material including manuals. All course material is in English and includes all third-party documentation. A copy of the training documentation is supplied to each trainee with an additional 3 master sets for the Employer's library and training department. All training material is also supplied in an electronic format for easy reference.

Training manuals are continuously updated by the Contractor up to the date of issue of the Defects Certificate for the whole of the works.

2.11.4 Operating, Maintenance and Engineering Training Manuals

The Contractor provides Operating, Maintenance and Engineering Training Manuals. The manuals are produced based on the agreed manual synopsis. Note that the manual synopsis is in addition to the documentation synopsis. The manual synopsis is submitted for acceptance during the system engineering stage of the project.

The quantity of manuals to be supplied is as follows:

- Synopsis (Manual) - 1 copy
- First Draft - 1 copy
- Final Draft/Pre-Print Proof - 1 copy
- Final Manual - 5 copies

All documentation is also to be handed over in an electronic format for easy reference.

2.11.5 Participation of Employer's Staff

The Employer intends to second staff, engineering, and maintenance, part-time or full-time to the Contractor's team during the engineering, installation, and commissioning stages of the contract, without affecting the prices.

The aim is that the Employer's personnel receive "on- job" training in order to become familiar with the equipment forming part of the works.

3 Engineering and the *Contractor*'s design

3.1 *Employer*'s design

3.1.1 SSC Process description

Coarse ash, from the boiler, falls into a bath of water contained by the SSC's top trough structure, which quenches the hot ash. The quenched ash is then conveyed to the front of the SSC by scrapers connected to a chain driven system. Part of the water is removed from the ash on the dewatering slope of the SSC. The de-watered ash is then transferred by discharge chute onto one of two Coarse Ash Conveyors (CAC).

SSC performs the functions of Boiler Bottom Ash (BBA) collection, dewatering of BBA, and provides a controlled rate of BBA discharge onto downstream plant. The SSC's top trough correctly filled with water working in conjunction with the dipper plates provides boiler sealing by preventing air ingress into the boiler via the SSC.

3.1.2 Mechanical Design

SSCs are currently driven by an electro-mechanical drive system which consists of an 18,5kW electrical motor directly connected to 3 reduction gearboxes. The output of the three-reduction gearbox is connected to a rack and pinion gear assembly which is linked by a chain. The SSC's drive shaft is directly connected to the pinion gear to provide drive torque to the SSC system. This drive assembly is supplied by PIV Gearboxes and Drives and produces 75 000 Nm of torque. The speed of the drive shaft can be varied using a variable speed gearbox in accordance with the ash production in the boiler. The maximum drive speed of the SSC is applied during backlog recovery conditions, refer to drawing 058/39872 in Table 13.

Figure 1: 3 gearboxes aligned to develop torque (Mechanical drive)

Drive torque from the drive shaft assembly is transmitted to the chains by means of removable sprocket teeth bolted onto the drive shaft. The teeth can be replaced should they get damaged or worn. Ash is moved by chain and scraper assemblies which are driven by the electro-mechanical drive systems. As the drive shaft rotates, it pulls the chain and scraper assembly up the de-watering slope. Ash is then pulled up the de-watering slope and discharged over the nose cone of the SSC at the head end of the dewatering slope.

Matimba's SSC uses a 26 x 100mm chain made of Cr Ni which is a steel alloy fabricated with a minimum of 10.5% chromium content by mass. This steel is a stainless-steel alloy (also known as inox steel) and is normally used for highly abrasive products and large dynamic loads. The chain is case hardened to 800HV in order to prevent wear during operation. The core of the chain is not hardened to ensure that material tensile strength is not compromised.

Figure 2: SSC chain and drive shaft assembly

Scraper bars connected to the chain are used to physically move the ash. Matimba uses a V shaped scraper. Ceramic tiles are installed inside the carry, return and dewatering slopes of the SSC in order to prevent wear between the scraper bar and conveying structure of the SSC.
The carry trough is filled with water in order to provide boiler sealing whilst also allowing hot ash from the boiler to be quenched and the return trough is kept dry.

Figure 3: V shaped scraper bars running on a dry return trough.

The take-up or tensioner system is positioned at the tail end of the SSC. It is used to prevent the SSC chain from losing tension and bundling under the guide idlers during operation. The chain is guided with in the SSC by a number of idlers. Submerged idler wheels are used in the upper trough of the machines and require adequate sealing designs to prevent water leakage from the upper trough to the outer environment. The rotation of the idlers downstream of the tension station is monitored by the revolution of the controllers. This device detects a breakage in the two chain strands.

3.1.3 Electrical Design

The existing SSC drive motors are powered from the Unitised 380V Unit Board D as indicated in table below:

Table 1: 380V Power supply to the existing SSC Drive Motor and Auxiliaries

System	Circuit Description	Board Description	Tier No.	Bucket	Motor (kW)	FLA (A)	No of Phases	Circuit Type	E-stop
Existing	Scraper Belt Drive	380V Unit * Unit Board D	27	BA001	18.5	38	3	H1-S7	No
Existing	SSC Speed Control	380V Unit * Unit Board D	24	DA001	<2	<4	3	H1-S7	No

* Unit 1-6

3.1.4 Control and Instrumentation Design

The unitized process plant control and monitoring functions at Matimba PS are realized through the Siemens Teleperm ME and Teleperm XP automation systems. The two automation systems are integrated via the OM650 bus onto a common HMI for the centralized control, operation and monitoring platform of the unitized plant. The complete control applications of the SSC are achieved through CRE02 of the Teleperm ME system whereas the alarm and indication applications of the SSC are realized through the Teleperm XP system.

3.1.5 Teleperm ME

The SSC conveyor belt system control applications currently reside in the Teleperm ME control system; specifically, CRE02 and constitute the main motor HDA10 AF001 and speed variator HDA10 AA001 via BC027 and BC003 DCS hardware respectively. The DCS hardware interface is depicted below.

Table 2: DCS hardware interface

BC027 (HDA10AF001)		
Signal	Description	Interface
On	Command	SWGR
Off	Command	
Test/Off Position	Feedback	
MCB Trip	Feedback	
On	Feedback	
Off	Feedback	

The automation unit hardware is fully utilized with no provision for expandability. Furthermore, the automation unit is obsolete.

3.1.5.1 Teleperm XP

The Teleperm XP automation unit acquires the indication and alarming signals related to the SSC. The automation unit hardware configuration consists of a main cubicle and extension cubicles CKA20 and CKA21 respectively. The two cubicles are both made up of two IO racks, AC/BC. The high-level IO configuration is depicted in Table 3 which shows rack AC of CKA20 as fully utilized and rack BC with very little spare. The extension cubicle is partially utilized for rack AC and 100% spares of installed IO modules. Also, there are available slots allowing for additional IO modules. Furthermore, the station procured 60 IO FUM modules (6 per unit) for spares holding strategy and to date 36 (7 per unit, 42 reserved for stator bar and 18 available for

spare. Additionally, 5 FUM 210 PER UNIT INSTALLED BUT NEVER INSTALLED CKA21) IO modules have been utilized making 24 IO modules available in spares. The IO modules are being used for the Stator Bar Temperature Transmitter installations which have been completed for units 1, 3 and 5 with the other units yet to be installed. The TXP system is obsolete, and no CPU is available in spares holding.

Table 3: Teleperm XP automation cubicle

Code	Rack	IO Module	Number	Available IO Capacity	Available IO slots
CKA20	AC	FUM 210/230	19 FUM 210 0FUM230	0% 0%	0
	BC	FUM 210/230	5 FUM 210 14 FUM 230	5% 5%	4
CKA21	AC	FUM 210/230	3 FUM 210 4 FUM 230	50% 50%	12
	BC	FUM 210/230	4 FUM 210 3 FUM230	100% 50%	12

3.1.5.2 TXP Engineering Station

The TXP automation system at Matimba is also equipped with an engineering and configuration system which is used to perform any engineering and configuration application changes to the TXP automation unit. No back-up, tapes are used for back-up.

3.1.5.3 TXP LCP

The SSC system is also equipped with a remote IO panel for the acquisition of all signals related to the SSC. The remote IO panel also allows for the localized operation of the different functions of the SSC. The internal layout of the IO station is depicted in Figure 4 below and consists of two racks, station 11 and station 12. Each station is equipped with individual power supply modules and two redundant communication modules. Furthermore station 11 is equipped with 3 DI and 2 DO modules whilst station 12 is equipped 5 DO modules. Module that currently does control is not pulse control.

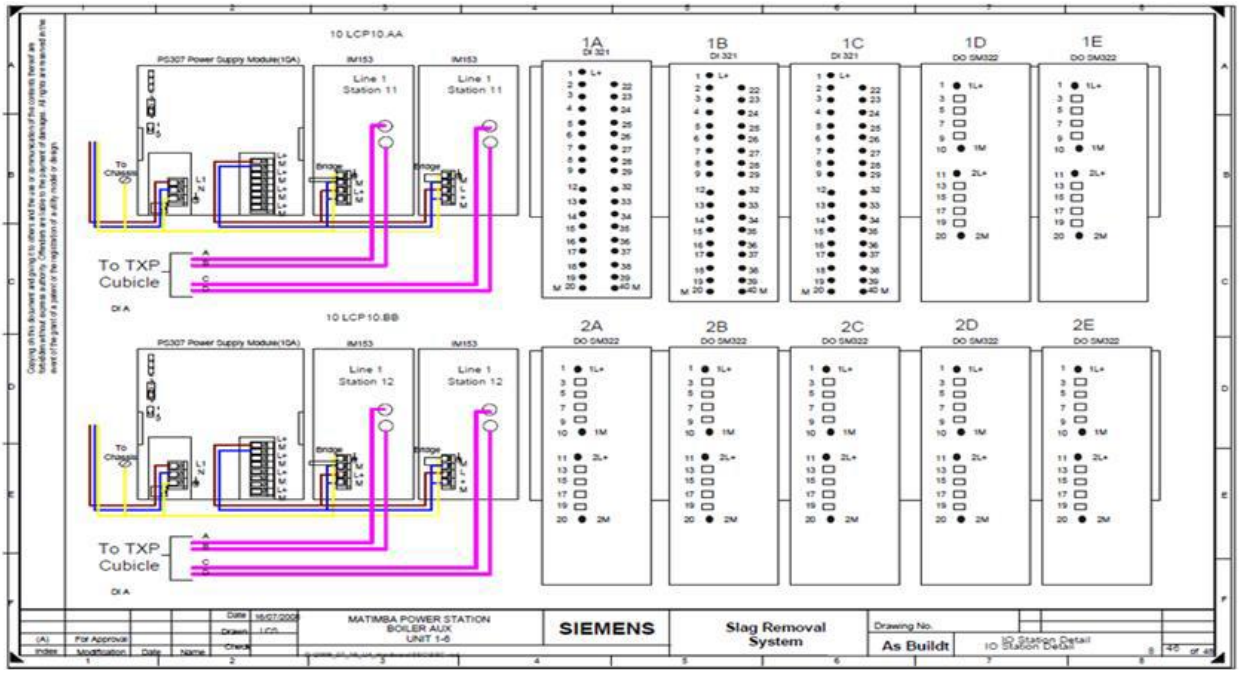

Figure 4: SSC Remote IO Panel Internal Layout

The IO assignment of the remote IO panel has been reviewed using existing design documentation and further verified during plant walks. The available spare capacity is summarized in Table 4 below. The first observation of the existing SSC remote IO panel design is that it provides for the processing of binary signals only. Also, from Table 4 below, it is clear that the existing IO's and din rails are fully utilized leaving no opportunity for expandability. Furthermore, the IO assignment related to the SSC conveyor belt is limited to 4 channels across 4 IO modules. Considering the above limitations, the option of decommissioning the existing IO related to the SSC conveyor belt and replacing them with IO's related to the hydraulic drive solution (i.e., using the remote IO panel for signal acquisition) is not feasible.

Table 4: SSC remote IO panel design

Item	Module	SSC Function Group	IO Type	Number of Channels	Utilization	Available Spares (%)
1A	Module DI321	SSC lifting devise	DI	32	32	0
1B	Module DI321	Immersion dampers	DI	32	32	0
1C	Module DI321	SSC lifting devise	DI	32	10	22
1D	Module DOSM322	Lifting devise	DO	8	7	1
1E	Module DOSM322	SSC lifting devise	DO	8	8	0
2A	Module DOSM322	SSC lifting devise	DO	8	7	1
2B	Module DOSM322	Immersion dampers	DO	8	7	1
2C	Module DOSM322	Immersion dampers	DO	8	8	0
2D	Module DOSM322	Immersion dampers	DO	8	8	0
2E	Module DOSM322	Immersion dampers	DO	8	3	5

3.1.6 SSC Operation

The SSC main motor drive * 0HDA10AF001 is operated either locally at the LCP or remotely from the unit control room. When the LCP selector switch is in local the SSC drive is switched on/Off locally from the push buttons provided on the LCP. The SSC drive can be switched on/Off from the control room provided that the LCP selector switch is in remote position.

The conveyor belt drive system is equipped with a variable gearbox located between the main electric drive motor and first reduction box. The variable gearbox has an internal hydraulic drive mechanism equipped with an electric servo motor HDA10 AA001 (also called speed variator) with maximum and minimum speed limit switches i.e., PIV Slip monitor relay located inside the variable speed gearbox. The speed of the SSC conveyor chain is varied by actuating the servo unit from either locally from the IO remote panel or the unit control room. This is done manually by the local or remote operator and is based on the unit operating load conditions. This functionality needs to be automated in the new drive design.

The variable gearbox is also equipped with a tacho generator HDA10 CS002 which provides the feedback of the variable speed system output to the control room in unit of percentages. The interface is via transducer module located inside the IO remote panel. The transducer is powered through 220VAC source internal to remote IO panel. The correct functioning of the conveyor chain is monitored through the SSC speed switch HDA10 CS001 located on the front-end bottom chain wheel shaft as well as a slip clutch monitors HDA10 CS101/102.

The IO remote panel is equipped with push buttons (PB) related to the operation of the variable speed-box.

Table 5: IO remote panel is equipped with push buttons

KKS	Signal	Function	Interface	Remarks
HDA10 AA001	XG02	SSC Low speed alarm	TXP	
HDA10 AA001	XG03	Lamp Test	TXP	
HDA10 AA001	XG04	Stop	TXP	
HDA10 AA001	XG05	Fault	TXP	
HDA10 AA001	XG06	Emergency stop	TXP	

The operating and monitoring functions of the main motor drive and variable gearbox, including its auxiliaries inside the LCP such as push buttons will be decommissioned.

The conveyor chain speed switch and slip clutch monitors will be retained as part of the new SSC hydraulic drive system.

3.2 Parts of the *works* which the *Contractor* is to design

3.2.1 General

The general scope related to the SSC drive replacement project include but not limited to the following:

- Decommissioning of the installed electromechanical drive system.
- Provision for the installation and commissioning of an electrohydraulic drive system including an air to oil cooler system.
- Provision for the installation of the hydraulic power pack and positioning.
- Provision for control and instrumentation design for control and indication capabilities.

3.2.1.1 Engineering and Design Activities

The Contractor shall perform all basic and detail design and engineering activities necessary for the development of the complete Mechanical, Electrical, Civil, Control and Instrumentation system requirements for the complete SSC hydraulic drive installation. This includes the Contractor's interfacing and participation with the Employer through clarification meetings in order to meet the control and instrumentation system design freeze.

The design and engineering activities *shall* include but not limited to the following:

- Preparation, review, clarification and final compilation of the design.
- Preparation, review, clarification and verification to ensure that the process plant logic diagrams and operating philosophies are consistent.

The Contractor shall further be responsible for the development and engineering of control, and operating philosophies of the complete SSC hydraulic drive as well as submitting and maintaining documents as defined in Vendor Documentation Submittal Schedule (VDSS).

The Contractor provides the Employer with the most suitable design for the application on Matimba Power Station. The aim will be to improve SSC availability and reliability.

The Contractor takes full responsibility for designing and supplying of all modifications that require the installation of the new power supplies and associated equipment.

The Contractor removes the existing drive system and chain assembly, as stated in the relevant section of this document, and moves them to a location on site identified by the Employer.

The Contractor supplies the Employer with drawings of all modifications of the upgraded system.
The Contractor submits a design which meets performance guarantee as stipulated in this document.

The system engineering documentation shall conform to all the requirements of Section 3.2.3.
System engineering activities shall be executed by the Contractor in active co-operation with the Employer. The Contractor shall perform the function of technical leader and shall take full responsibility for all technical interfaces for the plant control and instrumentation system design.

Design freeze shall be the acceptance of all documentation as per VDSS for the basic and detail design phases. There shall thus be a basic design freeze as well as detail design freeze.

The Contractor ensures that the quality process followed is line with ISO9001, by ensuring that quality documents such as QCPs during manufacturing, installation and commissioning are submitted to the Employer.

3.2.1.2 Design Inputs

- Boiler bottom ash
- Fraction : 20% of total ash,
- BBA production : 26.17 Tph (dry)
- Moisture content: 50%

3.2.1.3 Design Constraints

Scraper Bar

- Mass: 50 kg
- Length: 1.8 m
- Top width: 142 mm
- Height: 280 mm
- Web thickness: 16 mm
- Pitch: 1 m
- Volumetric efficiency at discharge: 50% (normal operation)
- Retained ash bed in water trough: 568 mm (normal operation, based on 2 x scraper height)

Chain

- Mass (single strand): 17.5 kg/m
- Breaking strength: 640 kN

SSC arrangement

- Length: 30.6 m
- Lift: 5 m
- Inclination angle: 40 degrees
- Water level above trough floor: 1.06 m
- Number of idler wheels: 8
- Mass of idler wheel: 500 kg

Drive System

- Sprocket PCD: 691 mm
- Hydraulic drive system efficiency: 80%

3.2.1.4 Design Properties

Boiler bottom ash

- Bulk density: 800 kg/m3 (dry)
- Bulk density: 850 kg/m3 (wet)
- Effective angle of internal friction: 20 degrees

The *Contractor* confirms BBA properties for use in their design from an ash sample if so required for design and component selection.

Scraper Bar

- Friction angle with liner: 28°
- Friction angle with BBA: 14°

3.2.1.5 Design Criteria

- The design criteria for this project are:
- The solution shall allow for 200 % backlog recovery.
- The mechanical solution shall as far as possibly include technologies already in use by Eskom, such as hydraulic drive motor design.
- The final solution shall not require extensive changes to the existing equipment.
- The current operating philosophy of the plant shall remain the same.
- Design life – 30 years, and
- 99.99% availability of the SSC from Outage to Outage (Eighteen (18) month period).

3.2.2 SSC Mechanical Design

The drive upgrade modification *shall* allow the SSC to convey a maximum of 105 Tph of BBA under backlog conditions at a speed no greater than 5 meters per minute. Under normal operating conditions when the Boiler is at MCR the SSC will convey an average of 52 Tph of ash at a speed of no greater than 2.5 meters per minute.

Modified SSC components *shall* be designed in a manner that allows for any maintenance activities to be performed without difficulty or the need to shut-down a unit excluding the replacement of chains and submerged idler wheels.

Electro-Hydraulic drive technology *shall* be selected for this design in order to take advantage of high torque capabilities of this technology. A cam curve radial piston direct drive arrangement *shall* be used for this design. A planetary reduction gearbox *shall* not be used due to the increase in components of the drive assembly, oil, maintenance requirements and the reduction in drive efficiency due to the addition of a gearbox.

3.2.2.1 Drive system

A hydraulic power pack unit shall be used to houses the electric motor, hydraulic pump, stainless steel reservoir (adequately sized for continuous duty) and all associated components that form the power pack unit. These hydraulic components shall be housed in an IP 65 rated cabinet in order to protect them from any potential ash and coal dust around the SSC area. The power pack shall be positioned on the ground floor area near the SSC drive head platform staircase on the west side of the SSC.

A closed loop hydraulic system for continuous duty shall be employed. One DOL 30 kW, 380 V, 50 Hz electric motor directly coupled to a 125 (cc) hydraulic pump with mechanical variable speed drive shall be used to pump oil within the system. The drive pump shall be a variable displacement pressure compensated unit, the displacement of which dictates the final speed of the drive motors. Variable oil flow shall be achieved using a 4 – 20 mA signal from the DCS, sent to the pump's servo to control the oil flow rate which in turn drives the hydraulic motor whilst controlling the SSC's drive speed. The drive shall be capable of operating at variable speeds ranging from 0.1 to 5 meters per minute. Reversing of the drive system shall also be possible to help recover the SSC during backlog start up conditions. The Contractor shall use a combination of stainless steel and flexible piping (suitable to transport hydraulic oil at the set operating pressure) to transport hydraulic oil from the pump to the drive motor. The Contactor ensures that sufficient flexibility is allowed for the SSC to move from its normal operating post to the maintenance bay without the need to disconnect the piping.

The electric drive motor shall start from an unloaded condition and operate continually at constant speed of 1500 rpm, driving the hydraulic pump via a direct coupling. The pump receives oil from the oil reservoir and pumps it to the hydraulic drive motor which shall be directly coupled to the existing drive shaft using a connecting stub.

Torque arms shall be utilized to contain the reaction forces and eliminate any undesirable forces on the motor bearings, thus providing a compact, simplified solution, also minimising replacement time. A hydraulic drive system which can produce a maximum torque of 75 000 Nm shall be employed.

Cooling of the hydraulic oil shall be achieved by an air-to-oil cooler (driven by one electric motor) which is thermostatically controlled. The air-to-oil cooler shall also be positioned on the ground floor near the SSC drive head platform staircase.

The drive assembly shall consist of a drive shaft with sprockets connected to the hydraulic drive train. The drive assembly shall remain at the head end of the SSC (at the top of the dewatering slope) with the drive shaft mounted to the SSC's structure using two split bearings on the shaft and a torque arm connection to the SSC structure. The original drive shaft shall be reused in the new design (180mm diameter shaft). A new stub shall be used to connect the drive shaft to the hydraulic motor. One side of the stub shall be splined in order to connect to the new hydraulic drive shaft and the other side shall have a keyway to allow the rigid coupling to be locked onto the drive shaft, refer to drawing 0.58-BMH-SSC-0039.

The drive shaft shall use split bearings assembled inside a plumber block to allow for the bearing to be replaced without the need to remove the drive shaft. Split bearing shall be sized to fit onto the original 180mm drive shaft. A safety factor of no less than 2 shall be employed for the design loading of the bearings.

Drive torque from the drive shaft assembly shall be transmitted to the chains by means of removable sprocket teeth bolted onto removable sprocket hubs. Sprocket hubs shall be locked onto the drive shaft using one key per sprocket hub. Drive sprocket teeth shall be vertically mounted onto the hubs and locked into position by side fitted bolts between the hub and sprocket teeth. Sprocket drive hubs shall fit onto the original 180 mm shaft.

3.2.2.2 SSC Structural Modification

The Contractor shall ensure that new components can fit onto the original SSC structure and ensures free movement of modified components.

3.2.3 Electrical System Design

The existing SSC drive motor gets its power supply from the Unitised 380V Unit Board D. The new SSC drive motor and its auxiliaries will maintain its power supply from Unitised 380V Unit Board D as follows:

Table 6: 380V Power supply to the SSC Drive Motor and Auxiliaries

System	Circuit Description	Board Description	Tier No.	Bucket	Motor (kW)	FLA (A)	No of Phases	Forward/ Reverse	E-stop	Comment
Existing	Scraper Belt Drive	380V Unit * Unit Board D	27	BA001	18.5	38	3	No	No	Bucket will be decommissioned
										and made an equipped spare.
Existing	SSC Speed Control	380V Unit * Unit Board D	24	DA001	<2	<4	3	No	No	Bucket will be decommissioned and made an equipped spare.
New	Scraper Belt Drive	380V Unit * Unit Board D	15	EA001	45	81	3	Yes	Yes	Spare unequipped bucket that will be used.
New	Electric heater	380V Unit * Unit Board D	19	CA001	0.75	2	3	No	No	Spare unequipped bucket that will be used.
New	Oil cooler	380V Unit * Unit Board D	19	DA001	0.75	2	3	No	No	Spare unequipped bucket that will be used.
New	Power pack Auxiliary	380V Unit * Unit Board D	19	EA001	0.75	2	3	No	No	Spare unequipped bucket that will be used.

* Applicable to Units 1-6

The scope of work to be executed by the Contractor:

3.2.3.1 LV Switchgear

Retrofit the circuits according to the loads in Table 2.

- Design, supply, install, secure, test and commissioning the circuits inclusive of all required functionality and accessories on the LV switchgear. The allocated respective circuits on the switchgear are identified in Table 2.
- E-stops shall be incorporated in the relevant circuits identified in Table 2.
- Decommission the circuits identified in Table 2.
- Interface with the DCS via the –X07 terminals as per the existing I/O. Existing I/O is as per Table 2:

Table 7: Existing I/O

Start
Stop
CB Fault
MCB Trip
Test Position

Signal to be added on the Scraper Belt Drive motor circuit:

- Emergency Trip

3.2.3.2 Cabling

- Design, supply, route, install, secure, terminate, test and commissioning of SWA cables inclusive of all required cable accessories, racking, from each unit's respective circuit identified in Table 2 to each of the loads.
- All cabling shall be in accordance with 240-56227443 - Requirements for Control and Power Cables for Power Stations Standard.
- Cable numbering shall be requested from the project manager and installed on all cables. Cable schedules shall be developed or updated (xls format) to include the new circuit descriptions, cable sizes and lengths, cable numbers etc. as per Electrical Cable Schedule template 240-56176097.
- Reuse existing cables for the existing loads, presented in Table 2, as far as possible. Decommission the cables that cannot be reused.

3.2.3.3 Electrical Bonding

- The motors and all supporting steel work and structures shall be bonded with the existing earth mat and shall be tested according to 240-56356396 – Earthing and Lightning Protection Standard.

3.2.3.4 Motors

- All motors shall be in accordance to 240-57617975 - New Low Voltage Motors Procurement Standard and 240-56361435 - Transport of Power Station Electric Motors Standard.

3.2.3.5 General

- Testing and commissioning of the integrated system shall be conducted to prove the correct functionality of the plant.
- Handover of the plant shall be done, and shall include all relevant documentation including but not limited to the following:
  - Cable test certificates,
  - Cable routing diagrams and cable schedules.
  - Motor test certificates.

3.2.4 Control and Instrumentation System Design

The general control and instrumentation scope related to the SSC drive replacement include but not limited to the following:

- Engineering of software application to Teleperm ME and Teleperm XP systems
- Decommissioning of the LCP (Local Control Panel) equipment related to the SSC drive
- The provision of the SSC hydraulic drive control and operating philosophies
- The provision of the SSC hydraulic drive functional logics
- The provision of SSC hydraulic drive field measurement and actuation equipment
- The provision of SSC hydraulic drive LCS (Local Control Station)

The Contractor supplies a detailed description outlining the control philosophy. The write-up includes, but not be limited to, start-up, shutdown, normal operation and special operating procedures.

3.2.4.1 Design

The control application of the conveyer belt will be achieved via the Teleperm ME and Teleperm XP systems. The Teleperm ME system will contain and retain existing logics related to the conveyer belt and will serve as main interface to the hydraulic power pack main electric motor and hydraulic power pack LCS. The Teleperm XP system will serve as the interface to the hydraulic power instrumentation (level, pressure and temperature transmitters, pressure switch) and drives (Electric heater and Oil cooler). The Teleperm XP will send binary signals to the Teleperm ME system for all interlocks signals required for the conveyer belt control.

3.2.4.2 Functional Requirements

The hydraulic power pack system field measurement and actuation equipment must be standardized in respect of make, model and type with those existing at Matimba PS so as to ensure simplified operation and maintenance regime as well as reduced lifecycle management costs.

Where field measurement and actuation equipment cannot be standardized with those existing at Matimba PS it must be motivated to the Employer for approval.

The hydraulic power pack system must be supplied complete with field measurement and actuation equipment required to ensure for the safe control, operation, monitoring and alarming of the plant.

The hydraulic power pack systems field transmitter measurement equipment performing control, protection and monitoring functions must employ 2oo3 redundancy configuration.
As a minimum temperature, level and pressure transmitter measurements must be provided as a 2oo3 configuration.

Except for the filter differential pressure switch, all other switches provided as part of the works shall be change-over contacts.

The hydraulic power pack system shall be equipped with a local control station for the localized operation of the SSC.

The local operation of the SSC shall be with a release interlock from the Teleperm XP/ME unit DCS. Further, the local control station shall be equipped with emergency push button which shall be hardwired to the switchgear to stop any running SSC in an emergency.

The complete monitoring, operation and control of the SSC system shall be done from the Teleperm ME/XP DCS.

The Teleperm ME/XP DCS automation unit is configured with two dedicated control processors such that in the event of one processor failure, the redundant processor takes over the processing function thereby maintaining high availability of automation system.

The main motor drive applications shall be carried out from the Teleperm ME via the existing BC027 drive card.

The SSC hydraulic power pack system redundancy shall be maintained in the DCS engineering by allocating equipment of similar functions to separate IO modules of the Teleperm XP unit DCS system.

The hydraulic power pack system shall further be integrated into the Plant Historian to archive process information of the SSC hydraulic power Pack.
Junction boxes shall be provided as interface point between the Teleperm XP unit DCS automation system and the rest of the plant measurement and control equipment.

The complete system between the field equipment and unit DCS system shall be hardwired.

Adequate separation shall be maintained between control and power cables in order to avoid interference.

3.2.4.3 Technical Requirements

3.2.4.3.1 Instrumentation

The Contractor shall provide all primary measuring elements necessary for binary and analogue controls as well as general measurements, gauges and test facilities necessary for the complete SSC hydraulic drive.

Transmitters shall have built in diagnostics that constantly monitor and alarm any faults on transmitter.

Excluding temperature transmitters, all transmitters shall have built in local digital indicators that can be programmed to indicate the range and specified engineering units for the process.

Temperature transmitters shall be DIN rail mounted inside junction boxes.

All transmitters provided shall have a high turn down ratio so that the minimum possible different types of transmitters can be used for all the applications.

All transmitters shall conform to a minimum accuracy span of 0.05%.

The use of binary switches is not permitted and shall only be limited to cases where they are required for statutory requirements and where they are necessary for protection and hardwired interlocking.

The use of switches shall be motivated and shall be submitted for approval by the Employer.

All binary switches provided as part of the Works shall be three-wire change-over-contact type.

All contacts shall be capable of handling at least 250mA at 36 V continuously.

Non-contact level instruments (ultrasonic, laser, radar) shall be the preferred way of measuring solids level in bins, and liquid level in tanks.

3.2.4.3.2 Instrument Racks

All transmitters excluding temperature transmitters provided as part of the Works shall be mounted on transmitter racks.

The Contractor is expected to motivate and request approval from the Employer for cases where transmitters are not mounted on transmitter racks.

All transmitter racks provided shall be durable, sturdy and suitable for the environment in which they are installed.

Where angle iron is used for transmitter racks, a minimum wall thickness of 3mm shall be provided.

Where transmitters cannot be mounted on transmitter racks the Contractor shall obtain clearance with the Employer on alternative solutions.

The transmitter racks shall be supplied complete with all holding down bolts and equipment to make a complete assembly.

The Contractor shall submit the design of transmitter rack typical showing rack layout for review and acceptance by the Employer.

The Contractor shall also submit the final design of instrument transmitter racks showing the number, location and equipment content.

3.2.4.3.3 Impulse Piping

The Contractor shall provide impulse piping for each measurement between the instrument and the root valve(s) forming part of the Works.

All pipe work provided shall be inclusive of supports, valves, fittings, transition pieces to primary isolating valves, condensing chambers for closed vessel level transmitters and drains to provide complete impulse lines for all instruments.

The material of impulse piping shall be suitable for application.

All welding shall be provided in accordance with the following standard:

- 240-43156827 - Introduction to the Welding Rulebook

Non-destructive testing shall be conducted on welds.

The results of all non-destructive testing on welds must be accepted by the Employer’s third party inspection authority.

3.2.4.3.4 Manifolds

3-way manifolds with pressure rating of 40MPa shall be used and shall provide for calibration, drain and process isolation valves.

The instrument manifolds shall be with ½ inch BSP connection.

The material for manifolds shall be suitable for application.

3.2.4.3.5 Junction Boxes

The Contractor shall provide junction boxes meeting the requirements of 240-56355815 - C&I Field Enclosures and Cable Termination Standards.

During basic and detail design the Contractor shall submit the junction box typical for review and acceptance. The typical shall document the junction layout, parts and material listing.

During basic and detail design the Contractor shall submit the junction box arrangement drawings for review and acceptance by the Employer. The junction box arrangement drawings shall show the location of junction boxes across the plant area.

The Contractor shall submit the junction box termination schedule showing the termination of plant equipment. During basic and detail design the Contractor shall submit junction box termination details.

3.2.4.3.6 Cabling and Racking

The scope of field/instrument cabling is defined as all cabling between field equipment and first junction/splitter box.

Trunk cabling is defined as all cabling between junction box and the automation system and PLC system, and between splitter boxes and automation system and PLC system and switchgear or MCC, and between stand-alone PLC system and power station automation system.

The Contractor shall provide for the design, supply, installation, labelling, termination, testing and commissioning of all field instrument and trunk cabling forming part of the Works.

All cables provided as part of the works shall comply with the requirements of 240-56227443 - Requirements for Control and Power Cables for Power Stations standard.

All field/instrument cabling shall have a minimum of 2 pairs (UVG02ACM) for junction boxes and 8 pairs (UVG08ACM) for splitter boxes.

All installed cables are tested to SANS 10142-1.

The Contractor shall provide the Certificates of Compliance for all electrical installations forming part of Works.

The Contractor shall provide cables schedules inclusive of origin, target, type and size.

3.2.4.3.7 Local Control Station

The philosophy of operation for the LCS shall be as per the technical guideline 240-56355729: Plant Control Modes Guideline.

3.2.4.4 Design Services for Preparation of Control and Instrumentation

The Contractor shall supply all relevant details and information of the plant control and instrumentation system design. The Contractor shall detail the field equipment design in the following specification documents:

- Appendix 2: Function IO Block Diagrams

The Functional IO Block Diagrams details the type and quantity of the inputs and outputs from control and instrumentation equipment. During tender, basic and detail design phase, the Contractor shall allocate Functional IO Block Diagrams to the control and instrumentation field measurement and actuation equipment in the instrument and drive/actuator schedule.

- Appendix 3: Instrument Schedule

The field instrumentation that shall be interfaced to the control and instrumentation system as analogue and/or digital input and output shall be populated in the Instrument Schedule. During tender, basic and detail design phase, the Contractor shall populate the instrument schedule with all equipment forming part of design.

- Appendix 4: Drive & Actuator Schedule

The field drive and actuation equipment that shall be interfaced to the control and instrumentation shall be populated in the Drive and Actuator Schedule. The Contractor shall populate the drive and actuator schedule with all equipment forming part of design.

- Appendix 5: Alarm and Limit Value List

The Alarm and Limit Value List shall list all the alarms for the system.

- Appendix 6: 220VAC Load Schedule

The Contractor *shall* document all power requirements for the complete system in the 220VAC load schedule.

3.2.4.4.1 Requirements Related to Technical Documentation

The basis for the completion of all engineering activities shall be acceptance of documentation as defined in Vendor Document Submittal Schedule.

The Contractor shall comply with the requirements of VGB-R 171e Provision of Technical Documentation (Technical Plant Data, Documents) for Power Plants.

All technical documentation shall be numbered and classified according to IEC 61355 and VGB B 103.
The documentation requirements shall cover all stages of the Works, from the engineering stages; through installation and commissioning; and operating, maintenance and training stages of the project.

3.2.4.4.2 Erection and Installation

This stage shall consist of the procurement, installation, and on-site inspection and testing of all supplied items forming part of the Works.

The Employer will specify hold and witness points during the installation and testing stages of the project.

The Contractor shall issue preliminary notification of such hold and witness points by giving not less than 28 days advance notice to the Employer and confirms such hold and witness points at least 7 days prior to the test activity.

3.2.4.4.3 Commissioning

Commissioning is defined as bringing into service all items of the Works and meeting the functional requirements and performance criteria of the Specification. This includes all necessary testing and verification

of the stated performance criteria. The Contractor shall commission all interfaces to control equipment provided by the Employer. The Contractor shall co-operate fully with the Employer in the commissioning of the plant for which the Employer will supply the portion of equipment, systems and control and instrumentation systems.

The Contractor shall provide all the test equipment required for the commissioning of the individual modules, the sub-assemblies and the functional groups.

This stage consists of all field equipment checks, loop checks, drive interface checks, and testing system functionality up to but excluding providing actuation power and process medium in the plant, energy whether electrical, hydraulic or pneumatic.

The Contractor shall submit the Cold Commissioning test results to the Employer at the conclusion of cold commissioning and request the commencement of hot commissioning.

Hot commissioning is where the plant processes are placed into operation in conjunction with the control and instrumentation system. The Contractor shall be responsible for the commissioning of the complete control and instrumentation system including the final control elements.

The commissioning activities shall be carried out in conjunction with the Employer.

The Contractor shall be responsible for the hot commissioning of all the equipment forming part of the Works and the interfaces to satisfy the requirements of the Specification.

In cases where various components are connected to form an integrated system, the Contractor, at the time of commissioning, shall carry the responsibility for the correct functioning of the whole of the system.

If a defect is identified in the equipment interfacing or external to the Contractor’s scope the Contractor shall request the Employer to rectify the defects.

3.2.4.4.4 As Built Documentation Package

As Built' documentation, as listed in Vendor Documentation Submittal Schedule (VDSS) shall be supplied by the Contractor to the Employer upon completion of capability testing.

Acceptance of the ‘As Built’ documentation is a pre-requisite for the Sectional Completion of the Plant Area concerned.

The documents shall be reviewed by the Employer for correctness and conformance to the accepted design.

3.3 Operating description

This section describes the required SSC’s operating philosophy design using the new electro- hydraulic drives directly mounted onto the drive shaft.

The Contractor ensures that the speed of the main hydraulic drive system may be varied based on the ash production from the boiler, with maximum drive speed being applied during backlog recovery (4m/min). Under normal operating conditions the operating speed of the SSC shall be limited to no greater than 2.5m/min in the forward direction. The SSC shall have the capability to reverse. The drive system shall be capable of

break-away starting after a six-hour backlog period or after backlog accumulation as stated in Matimba's SSC standing time procedure.

SSCs shall continue being operated from the unit control room and can be operated locally in the filed or remotely in the unit control rooms.

Local Mode:
SSC shall have a local operating mode in the field for maintenance purposes. This mode shall allow the system to be operated with all protections in place. All control buttons, selector switches and emergency stop push buttons shall be interfaced to the SSC's main drive control panel (0*0HY101).

Remote Mode:
This mode shall be used during normal operations of the system. Plant operator shall be given the ability to automatically control the SSC in the unit control room, and all protections shall be in place.

SSCs shall be automatically controlled by the DCS to perform the following functions:

- Interlock the starting and stopping of the SSC based on the availability of downstream conveyors,
- Use the SSC's main drive system pressure to determine the required operating speed,
- Use the SSC's main drive system pressure to start the agitation system pump,

Start and stop the agitation pump every 30 minutes and run the pump for one minute (based on pressure setting),

- Use the SSC's water level transmitter to control the SSC's water makeup systems,
- Interlock the starting and stopping of the SSC based on the position on the tensioner system proximity switches.
- Trend SSC operating parameters, and
- Indicate alarms.

Operators shall be given the ability to increase or decrease SSC speed in the control room. Operators shall also be given functionality to allow for local operation of the SSC in the field.

The following main hydraulic drive alarms shall trip the SSC when triggered and send the signal to the local control panel and unit control room:

- Low charge pressure
- High oil temperature,
- Low oil temperature
- Low oil level,
- Suction valve closed,
- Filter clogging,
- High electric motor temperature, and
- Emergency stops.

The emergency stop button shall be employed at the display of the local unit controller. This emergency stop button shall be wired to trip the main hydraulic drive electrical motor switchgear whenever it is activated.

Alarms
The following main hydraulic drive system instruments shall alarm when triggered and send the signal to the local control panel and control room for units:

- Oil temperature high warning,
- Oil temperature low warning,
- Filter clogging warning, and
- Low oil level warning.

Interlocks
The SSC shall be interlocked to start when the following parameters are met:

- Coarse ash conveyor **ETA10 or **ETA20 is operational and flopper chute limit switch has been made for the available conveyor,
- Oil temperature is within the required set-point,
- Charge pressure is as per required set-point, and
- Oil filter deferential pressure is as per required set-point.

The SSC shall be interlocked to trip when the following parameters are met:

- Coarse ash conveyor **ETA10 or **ETA20 trips,
- Oil temperature is below or above the required set-point,
- Charge pressure is below required set-point., and
- Oil filter deferential pressure is required set-point.

3.4 Technical risk assessments

3.4.1 HAZOP Studies

a) The *Contractor* carries out formal HAZOP Studies on all systems in their supply. These studies are done in accordance with the requirements as laid down in the Eskom HAZOP Guideline: 240-49230111.

b) All recommendations are included in the *Contractors* designs. This is submitted to the *Project Manager* for acceptance.

3.4.2 FMEA (Failure Mode and Effect Analysis)

The Contractor carries out formal Failure Mode and Effect Analysis (FMEA) Studies on all systems in their supply. These studies are done in accordance with the requirements as laid down in the Eskom FMEA Guideline: 240-49230046.

3.4.3 Fire Protection Requirements

The Contractor complies with the requirements of Form 74 – SHEQ Specification pertaining to fire protection. The Contractor ensures that adequate firefighting apparatus is provided at all his/her work sites, and that their staff is trained in the use of this apparatus.

3.4.4 Safety Signs

The Contractor supplies all Symbolic Safety Signs for the respective areas under this contract as per SANS 1186.

3.5 Other requirements of the contractor's design

The Contractor submits designs to the Employer for review and acceptance. The Contractor may only purchase or fabricate components after designs have been accepted by the Employer. Drawings produced by the Contractor and accepted by the Employer will belong to the Employer.

3.6 Procedure for submission and acceptance of *Contractor*'s design

On completion of the optimization and testing phase the Contractor requests the commencement of operational acceptance tests from the Project Manager. The Contractor produces a detailed operational acceptance test procedure twenty working days in advance for acceptance by the Project Manager. This is shown on the Accepted Program.

On completion of the operational acceptance test the Employer runs the works for an unbroken period of 72 hours without malfunctions. During this period any or all functions may be exercised. In the event of any defect being detected, the Contractor remedies the fault, and the 72-hour test shall be restarted.

3.7 As-built drawings, operating manuals and maintenance schedules

3.7.1 Documentation Synopsis

The documentation synopsis is a summary and general view of the whole documentation package and provides the Project Manager with a clear indication of its content for assessment and acceptance.
The Contractor's documentation synopsis is agreed upon at contract award and defines the minimum documentation.
The Contractor will supply the following documentation as a minimum:

- Schematic drawings of the hydraulic drive components and assembly
- Operating and maintenance manuals

3.7.2 As Built Drawings and Documents

The Contractor's documentation will include all program listings, a written philosophy for part of system that will be installed and all manuals for the equipment.

4 Procurement

4.1 Minimum requirements of people employed on the Site

- All people employed to Provide the Works shall have South African Citizenship. If international employees will be employed to Provide the Works, they shall have official work permits.
- All people employed to Provide the Works shall be trained on health and safety
- All people employed to Provide the Works shall be trained on doing risk assessment

4.2 Subcontracting

4.2.1 List of Proposed Sub-Contractors

The Contractor indicates on a list the names of any sub-contractors whose services may be used to Provide the works. The Contractor provides a short description of the work it is proposed to sub-contract to each, together with an approximate value of the work to be executed by each sub-contractor.

Where the sub-contractor will be required to do physical work on site the Contractor provides details on the experiences of the mentioned sub-contractor as well as a list of references involving work of a similar nature. Notwithstanding the inclusion of a sub-contractor's name below, the Contractor obtains the written acceptance of the Project Manager prior to the employment of such sub-Contractor on the Site.

The Contractor will provide details of previous works and references of work done by the intended subcontractor.

5 Construction

5.1 Facilities provided by the Contractor

- All transport to site for hydraulic drives and accessories.
- Accommodation if needed is for the Contractor's own account.
- All tools must be provided by the Contractor for the works.
- All workshop machinery must be provided by the Contractor for the works.
- All office equipment must be provided by the Contractor for the works.
- Telephone bills will be paid by the Contractor.
- The Contractor must provide working procedures for each activity to the Employer's Representative at least 2 weeks prior to outage before work may proceed. This procedure will include "Safe working procedures".
- The Contractor must provide all the material needed for the works. The safeguarding, care and security of all equipment and materials while the Contractor is performing the works is the responsibility of the Contractor.
- If the Contractor uses portable two-way radios, the Employer's Representative must approve the type and make.
- All redundant Contractor's material must be moved to allocated sites. No scrap shall be stored in the Contractor's yard. Scrap must be cleared of site daily.

5.2 Temporary works, Site services & construction constraints

5.2.1 Employer's Site entry and security control, permits, and Site regulations

The Contractor complies with the following:

- Matimba Power Station Health and Safety Standards as per Matimba Power Station Health & Safety Specifications for Contractors (PA/270/003).
- Compliance with Eskom & Matimba No Smoking Policy
- Adhere to the OHS Act 85 of 1993
- All staff will undergo Safety Induction, presented by Matimba Risk Management Department
- Adhere to Eskom Cardinal Rules at all times
- The Contractor must conform to the access control requirements as set out in the document called Health and Safety Practices for Contractors at Matimba Power Station".
- The Contractor must conform to the requirements set out in the document called "Eskom Environmental Practices and Standards".
- Names and Identity numbers are required seven working days before the contract starts. Photocopies of Identity documents are also required. This must be arranged with the Employer's Representative.
- Lost permits will be paid for by the Contractor to Protective Services at a cost of R30-00 per lost permit.
- Only work vehicles with an approved permit will be allowed on site. No private vehicles will be allowed on site.
- Arrangements must be made with the Employer's Representative well in advance to allow sub-contractors on site.
- The transport of any equipment onto site must be declared and documented at Protective Services in order to facilitate the future removal thereof.

- Eskom may at its discretion provide any spare parts, materials or equipment as may be required for the execution of the contract works.
- At least one supervisor shall be authorized as a Responsible Person in terms of the Eskom Plant Safety Regulations to take out Permits to Work on plant.

5.2.2 Restrictions to access on Site, roads, walkways and barricades

The contractor shall adhere to site procedures for roads, walkways and barricades

- The Contractor must conform to the access control requirements as set out in the document called “Health and Safety Practices for Contractors at Matimba Power Station”.
- The Contractor must conform to the requirements set out in the document called “Eskom Environmental Practices and Standards”.
- Names and Identity numbers are required seven working days before the contract starts. Photocopies of Identity documents are also required. This must be arranged with the Employer’s Representative.
- Lost permits will be paid for by the Contractor to Protective Services at a cost of R30-00 per lost permit.
- Only work vehicles with an approved permit will be allowed on site. No private vehicles will be allowed on site.
- Arrangements must be made with the Employer’s Representative well in advance to allow sub-contractors on site. The transport of any equipment onto site must be declared and documented at Protective Services in order to facilitate the future removal thereof.
- Eskom may at its discretion provide any spare parts, materials or equipment as may be required for the execution of the contract works.
- At least one supervisor shall be authorized as a Responsible Person in terms of the Eskom Plant Safety Regulations to take out Permits to Work on plant.

5.2.3 Health and safety facilities on Site

- The Medical Station is available on site during normal working hours. The after-hours emergency telephone number is 014-763-8311 or from a Matimba phone the extension is 5000 that can be phoned for assistance.
- Fire protection and rescue services are available on site 24 hours per day.

5.2.4 Publicity and progress photographs

Cameras and publishing of progress photographs is prohibited

5.2.5 Contractor’s Equipment

The contractor shall register all their equipment and declare all their belongings at the security gate upon arrival. Unregistered belongings upon arrival will not be allowed to be removed offsite.

5.2.6 Equipment provided by the Employer

Non

5.2.7 Site services and facilities

Employer will provide:

- Power
- Water
- Waste disposal
- Lighting
- Toilets

The contractor shall provide everything else necessary for providing the works.

5.3 Completion, testing, commissioning and correction of Defects

5.3.1 Sectional Completion

Completion per section is defines as follows:

- Successful completion of the 72 hours operation acceptance test
- Documentation in each unit is updated to the latest “as built” status
- New system documentation and drawings in each unit equipment room

5.3.2 Completion of the Whole of the Works

Completion of the whole of the works is defined as follows:

- All SSC drives have been replaced with hydraulic drives and commissioned in all units.
- All units have successfully completed the 72 hours operation acceptance test.
- All spares that will be required in the next outage for all units are available with excess for each spare in case of failure before outage.
- All documentation and drawings updated and integrated into the Employer’s documentation.
- All maintenance documentation, check sheets and procedures are updated and integrated into the Employer’s documentation.
- All training has been completed.

5.3.3 Maintenance Spares

The Employer must be capable to support Matimba with respect to spares when required. This means that spares will be kept in the Matimba store.

The Contractor shall make recommendations and supply a spares list with a price per component. The validity of this spares list is 12 months. The Employer reserves the right to purchase these spares within 12 months of the signing of the contract.

5.3.4 Commissioning Spares

The Contractor keeps sufficient spares to maintain the whole of the works up to the Defect date. If the Contractor is not planning to keep spares, a contingency plan should be put in place, and accepted by the Project Manager.

5.3.5 Performance tests after Completion

5.3.5.1.1 Capability Accaptance Test

The responsibility to perform a Capability Acceptance Test (CAT) lies solely with the Contractor to demonstrate compliance with the specification. The Contractor supplies the commissioning, testing, optimisation and take-over documentation for the Engineer's acceptance and demonstrates compliance during the commissioning, testing and take-over phases.

Before starting with the test, record the condition of the items as shown in the table below.

Pre-testing check sheet and Preparation

Item	Description	Resp.	Checked	Date	Signature
1.	Check SSC chain tension				
2.	Check SSC drive oil level				
3.	Test SCC make up valves				
4.	Check SSC drive chain washing				
5.	Check load on the chain to ensure no backlog				

5.3.5.1.2 Performance Testing

After a successful light up, allow the unit to run for 3 hours at full load under normal operating conditions. After 3hours have lapsed the SSC must be started for a duration of 30 minutes. With the 30-minute run complete, fill the below table.

Item	Description	Resp.	Value	Date/Time	Signature
1.	Unit Generating load				
2.	Boiler thermal load				
3.	SSC actual speed				
4.	SSC hydraulic drive oil temp.				
5	Hydraulic system pressure				

Lower the boiler load to 330MW. Shut down the SSC while the boiler is at half load for a further 3hrs.

5.3.5.1.3 Capability Testing

Before stating the SSC for a reliability test, ensure that the SSC goes into to backlog control philosophy on the HMI before the SSC main drive motor can be started. With the SSC running in automatic mode, the following parameters must be monitored and recorded. Ensure that the SSC is started with minimum speed.

Item	Description	Resp.	Value	Date/Time	Signature
1.	SSC actual speed				
2.	SSC hydraulic oil temp.				
3	Hydraulic system pressure				

NB: The ash accumulation on the SSC water bath must always be below the SSC water level. If at anytime the ash seems to accumulate above the water level, start the SSC to reduce the backlog. Before any test is conducted, the Power Island must be stable and running on fully automatic with no standing alarms.

5.3.5.1.4 Acceptance Criteria

For all the tests conducted, the main process parameters must stay within prescribed limit i.e., SSC hydraulic drive oil temperature to remain within the operational limit, and SSC speed to match the boiler load and control room speed to match perfectly with the physical speed in the plant. The hydraulic drives must provide controlled, adequate torque to convey the ash and must also vary the main drive chain speed according to the rate of ash accumulation inside the boiler.

6 List of drawings

6.1 Drawings issued by the *Employer*

Table provides a list of drawings to be used for Information only, issued by the Employer at or before the Contract Date and which apply to this project. Note: Some drawings may contain both Works Information and Site Information.

Drawing number	Revision	Title
20.58/39872	**0**	Matimba Power Station Ash Plant SSC Drive Station
20.58/39872	0	Matimba Power Station Ash Plant SSC Drive Station
20.58/52720	**1**	Matimba Power Station Submerged Scraper Conveyor Scraper Bucket
20.58/52720	**0**	Matimba Power Station Hub Cover For SSC Watertight Chain Roller *500
PVVN/HAD/001	**7**	Submerged Scraper Conveyor retention time, backlog clearance and coarse ash emergency offloading
PS/244/001	**5**	Waste Management Procedure
PP/HAD/001	**1**	Operating and Control Philosophy Submerged Scraper Conveyor
PG/HAD/002	**6**	Maintenance Execution Strategy for the Submerged Scraper Conveyor Plant
N/A	**A**	Matimba Power Station Boiler Aux unit 1-6 Slag Removal System LCS
		Matimba Power Station SSC IO List
058/27353	**4**	Matimba Power Station SSC Speed Control Function Chart
058/27354	**4**	Matimba Power Station SSC Motor Function Chart
058/31477	**4**	Matimba Power Station SSC Motor Circuit Diagram
058/31476	**4**	Matimba Power Station SSC Speed Control Circuit
058/27355	**3**	Matimba Power Station Slag REM Belt Speed Function Chart
058/27339	**4**	Matimba Power Station SSC EM Make-Up VLV Function Chart
058/31449	**4**	Matimba Power Station Calculation Module Binary Circuit Diagram

058/31450	**2**	Matimba Power Station Calculation Module Binary Circuit Diagram
058/314467	**2**	Matimba Power Station SSC EM Make-Up VLV Circuit Diagram
058/31478	**4**	Matimba Power Station SLAG REM In POS Circuit Diagram
058/41778	**AG**	Matimba Power Station SLAG REM WTR LVL Circuit Diagram
058/31480	**AG**	Matimba Power Station SLAG REM Belt LO SPD Circuit Diagram
058/31481	3	Matimba Power Station SLAG REM Belt Speed Circuit Diagram
058/31482	2	Matimba Power Station SLAG REM WTR T Circuit Diagram

C3.2 *CONTRACTOR*'S WORKS INFORMATION