Eskom	Scope of Work	Generation

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Content

1. Introduction

Tutuka Power Station is a coal fired power station and has 3 600MW installed capacity and was constructed in the mid 1980's.

According to the Engineering Profession Act (No 46 of 2000), "Engineering must therefore be carried out competently, responsibly and ethically; use available resources efficiently; be economic; safeguard health and safety; be environmentally sound and sustainable; and generally manage risks throughout the entire lifecycle of a project, product or system"

This document outlines the scope of work required to place a Multidisciplinary Professional Services Contract for Engineering Resources at Tutuka Power Station. The engineering resources to render professional services for a 12 months' duration, and be equipped with:

- BSc. /BEng degree (i.e. Civil, Mechanical and Chemical,
- Minimum 5 years' power plant work experience, and
- Registered as Candidate Engineers with ECSA.

The purpose of this document is to outline the scope of work required to place a Multidisciplinary Professional Services contract for Engineering Resources at Tutuka Power Station

2. Supporting Clauses

2.1 Purpose

The purpose of this document is to outline the scope of work required to place a Multidisciplinary Professional Services contract for Engineering Resources at Tutuka Power Station

2.2 Applicability

This document shall apply to Tutuka Power Station only.

2.3 Effective date

The effective date will be from the authorisation date.

2.4 Normative/Informative References

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

2.4.1. Normative

[1] 240-53114002: Engineering Change Management Procedure

[2] 15ENG GEN-2068: Technical Evaluation Strategy for Multidisciplinary Professional Services Contract for Engineering Resources at Tutuka Power Station

[3] 240-53114026 Project Engineering Change Management Procedure

[4] 240-53114193 Occurrence and Incident Management

[5] ISO 9001 Quality Management Systems

[6] ECSA Code of Conduct for Registered Persons: Engineering Profession Act, 2000, (Act No.46 of 2000)

[7] 32-1034: Eskom's Procurement and Supply Chain Management Procedure

[8] Occupational Health and Safety Act (No. 85 of 1993)

[9] Construction Regulations 2014

[10] National Water Act (Act No. 36 of 1998)

[11] Engineering Drawing Standard

2.4.2. Informative

[12] 240-4332798 Engineering Policy

[13] 240-53114186 Document and Records Management

[14] 240-53114190 Internal Audit Management

[15] 240-53114192 Corrective and Preventative Action

[16] 240-77801161: Inspection of Boiler Structural Supports – Conventional Fossil Fuel Fired Power Stations Standard

[17] 240-144332407: Guideline for Eskom Power Stations Concrete Remedial Work

[18] 240-144387236: Guideline for Eskom Power Stations Geotechnical Engineering Remedial Work

[19] 240-142483465: Guidelines on Maintenance and Rehabilitation of Roads

[20] 240-142484987: Inspection Guidelines for Railway Maintenance and Rehabilitation

[21] 240-56364545: Structural design and engineering standard

[22] 240-53113685: Eskom Design Review Procedure

[23] 240-53114186: Document and Records Management

[24] 240-53665024: Engineering Quality Manual.

[25] 240-83539994: Standard for Non-Destructive Testing (NDT) on Eskom Plant

[26] Dam Safety Regulations, Government Notice No. R. 139 of 25, 24 February 2012

[27] Government Notice No. 704 of the National Water Act, 4 June 1999

2.4.3. Drawings

[28] 0 61/28 Rev 0-Location of Tutuka Power Station

[29] 0.61/2 Rev 1-Station Layout

[30] 0 61/29 Rev 4-Main Station Terracing Layout and Details

[31] 0 61/36 Rev 19-water and electrical layout

[32] 0 61/133 Rev3- Drainage GA Road Dirty Storm Water and Sewer

[33] 0 61/310 Rev 2-Roads Key Plan

[34] 0 61/680 Rev 8-Roads, Main Station Layout Plan

[35] 0.61/77 Rev 8-Storm Water Drainage Layout

2.5 Definitions

Terminology	Description
Inspection	Activities which by means of examination, observation or measurement, determine the conformance of material, parts, components, etc. to predetermined specifications and quality requirements.
Client	Tutuka Power Station
Civil Engineering Resources	Four Candidate Engineers with a BSc. /BEng in Civil Engineering, registered with ECSA and have power plant work experience related to the design, construction, and asset management of Civil and Structural Engineering infrastructure i.e. steel, concrete, stormwater, sewage, dams, roads, railway, buildings, etc.
Contractor	An *Employer* appointed by the Client to source engineering resources that meet the scope requirement of providing the multidisciplinary professional services contract for Tutuka Power Stations
Design	Concept Design-Task includes conducting studies, investigations, inception development, preparation and submission of reports specifying preliminary proposals and/or initial feasibility studies. Task is executed in accordance with Client's Engineering Change Management procedure [1]. Detail Design-Developing approved concept to finalise the design as per the Client's Engineering Change Management process [1]. Output of detail design includes but not limited to technical specifications, drawings, cost plan, bill of quantities/cost estimates, financial viability and programme for the project.
Turbine Engineering Resources	Six Candidate Engineers with a BSc. /BEng in Mechanical/Chemical Engineering, registered with ECSA and have power plant work experience related to the fundamental role of optimisation, and enhancement, where possible, of the Energy Conversion process at a power station. This applies to the water & steam, condensing, feed heating, cooling water, turbo-generator effectiveness and auxiliary power.

Process Engineering Resources	Two Candidate Engineers with a BSc. /BEng in Chemical Engineering, registered with ECSA and have power plant work experience related to the fundamental role of optimisation, and enhancement, where possible, of the Energy Conversion process at a power station. This applies to the coal, milling, air supply, combustion, heat transfer, water & steam, condensing, feed heating, cooling water, turbo-generator effectiveness and auxiliary power.

2.6 Classification

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

2.7 Abbreviations

Abbreviation	Explanation
BEng.	Bachelor of Engineering
BSc.	Bachelor of Science
ECM	Engineering Change Management
ECSA	Engineering Council of South Africa
DWS	Department of Water & Sanitation
ISO	International Standards Organisation
N/A	Not Applicable
NEC	New Engineering Contract
PM	Planned Maintenance
PLCM	Project Lifecycle Model
QIM	Quality Issue Management
QM	Quality Management
QIP	Quality Inspection Plan
SANS	South African National Standards
SHERQ	Safety, Health, Environmental , Risk & Assurance

2.8 Roles and Responsibilities

2.8.1. Civil Engineering

- Compiles Civil Scope of Work
- Engineering Service Manager for Civil Engineering resources

2.8.2. Turbine Engineering

- Compiles Turbine Mechanical Scope of Work
- Engineering Service Manager for Turbine Engineering resources

2.8.3. Process Engineering

- Compiles Process Engineering Scope of Work
- Engineering Service Manager for Process Engineering resources

2.9 Process for Monitoring

The tender committee will adjudicate the tender evaluation and contract appointment

2.10 Related/Supporting Documents

As per section 2.4

3. Scope of Work

3.1 Contractor's Engineering Resources

The Contractor is to render a multidisciplinary professional services contract for engineering resources. The required professional engineering resources:

a. To service the Client's Civil Engineering, Turbine Engineering and Process Engineering.
b. Include 4x Civil Engineers, 6xTurbine Engineers and 2 Process Engineers.
c. Must be equipped with a minimum qualification in BSc. /BEng degree in Civil, Mechanical /Chemical, and Chemical Engineering
d. Must be equipped with minimum 5 years' power plant work experience, and be registered as Candidate Engineers with ECSA.

The above engineering resources take the full professional, technical responsibility and accountability of the Civil, Turbine and Process Engineering plants. Acquiring these resources to ensure that the Client's Civil, Turbine and Process Engineering Plant complies to be safely operated and maintained.

As part of the tender submission, Contractor to submit a list of engineering resources shortlisted to attend the Client's compulsory interview process. Contractor must identify the engineering resources suitable to execute the required works for the Client's Service Managers to approve and conduct compulsory interview sessions with the individual engineering candidates. If the Tenderer/Contractor does not submit the list of successful engineering candidates, that Tender/Contractor will be disqualified from the tendering process. If the engineering candidates fail to pass the Client's interviews, Contractor to seek and submit respective list of engineering candidates within 3 days for the Client's Service Managers to approve and conduct compulsory interview sessions with the individual engineering candidates. Successful engineering candidates to immediately commence with their duties, after Client's Service Managers have conducted interviews and issued interview results to the Contractor.

a) All technical queries to be directed to the Client's Service Managers.

b) Tenderer/Contractor to provide tender returnable submissions in accordance with the Client's Technical Evaluation Strategy **[15ENG GEN-2068]** and Scope of Work **[15ENG GEN-2067]**.

3.2 Work to be performed by the Contractor's Professional Engineering Resources

The duties of the engineering resources are to

a) Optimise the performance of allocated plant
b) Identify and resolve problematic plant issues
c) Manage plant modifications
d) Manage engineering projects
e) Provide technical advice and assistance

4.3.1. Optimise The Performance of the Allocated Plant

- Establish performance targets, standards and indicators by studying statutory manuals of instructions and operations, manufacturers' guides, catalogues and Eskom directives and policies
- Determine the operability and maintainability of systems and develop the life of plant plan taking into account present status of plant, possible component obsolescence, modifications, etc
- In conjunction with Maintenance department determine/design spare and inventory requirements and specifications by interpreting design codes and QA controls
- Develop long term plant health indicators for responsible plant by determining applicability and validity of current indicators and taking into consideration plant modifications, technical developments, trends of overall system performance characteristics, etc
- Concur/review/draw up special test requirements
- Integrate the relevant design codes with the appropriate QC control
- Develop and maintain operating technical specifications, specific operating instructions/operating set points, alarm response procedures and map work flow
- Develop scope of work for outage
- develop the monitoring, maintenance and inspection strategy in line with Eskom Standards and Procedure, and associated legislations. The Contractor's engineering resources will perform plant inspections related to the Client's Civil/Structural and Mechanical Plants as and when required.
- Compile and update plant maintenance strategy on MBSA tool
- Carry out root cause analysis and incident investigation, and implement corrective as per the Client's Occurrence Manage system [4].

4.3.2. Identify and Resolve Problematic Plant Issues

- Apply reliability engineering techniques/methods and determine root causes of problematic plant
- Obtain subject specialist assistance/advice with complicated problems
- Identify and test alternatives to determine effect of alternatives on plant reliability, availability and maintainability
- Do cost analysis, recommend and initiate corrective actions
- perform risk assessments
- Perform investigations as per occurrence management process

4.3.3. Manage Plant modifications

In accordance with the Client's ECM procedure [1]:

- Design modifications to plant
- Develop, verify and validate relevant modifications packages
- Identify applicable standards and develop specifications for new and replacement equipment and/or infrastructure

4.3.4. Manage Engineering Projects

- Compile scope of work of project and tender specifications
- Compile technical and procurement documentation in accordance with Client's ECM [1] and PLCM process, Procurement Procedure [4], and necessary NEC documentation. This also includes confirming and implementing procurement strategies and procedures for effective and timeous procurement of necessary resources for execution of project/s.
- Evaluate technical competencies, previous performance, cost, etc and make recommendations
- Manage work progress, identify and investigate critical problem areas, initiate corrective actions
- Solve process/system problems. Investigate problem areas and obtain specialist assistance when required
- Coordinate testing and commissioning of modifications/plants and the acceptance/hand-over of projects
- Verify that all the project work is carried out in accordance with quality requirements. Investigate non-conformances and initiate/implement corrective actions
- Maintain technical integrity of plant
- Monitor the execution of contracts
- Verify adherence to contract specifications
- Participate in squad checks on enquiries for tender purposes
- Evaluate the economic and financial viability of proposed projects and compile business cases.

4.3.5. Provide Technical Advice and Assistance

- Develop project programme
- Post project reviews
- Compile schedules/budgets
- Compile relevant procedures etc
- Maintain system history database
- Design plant system modifications
- System operability and maintainability
- Optimise and execute life of plant plan
- Integrate/interpret relevant design codes with appropriate QA controls
- System interface requirements
- Participate in the technical evaluation of suppliers

4.3.6. Training of staff

To continuously assist with the training of the Client's engineers by transferring knowledge and skills through mentoring, coaching, and supervising. The Client's engineers to form part of the Contractor's team during execution of investigations, inspection and adhoc concept and detail designs.

4.3.7. Meetings, Task Teams and Committees

The Contractor's engineering resources must avail themselves to represent Civil, Mechanical and Process Engineering in the following meetings:

- Plant Focus
- Production Meeting,
- Technical Plant Meetings
- Outage meetings
- Project Meetings
- Meetings internal or external to the Client regarding Civil Engineering plant related issues
- Plant Modification Meetings i.e. ECM, care groups
- SHEQ Meetings
- As and when required by the Client's Service Managers

4.3.8. Perform any Other Legitimate Activity as Required

The minimum qualification for the required engineering resources is a *BSc Eng./B Eng. and 5 year's power plant work experience.* The required skills/competencies for the engineering resources include but not limited to the following:

- Computer literacy;
- Communication;
- Analytical skills;
- Root cause analysis;
- Project management;
- National and international engineering codes and standards;
- Leadership skills;
- Financial and
- Plant fundamental policies.

5. Labour, Materials and Machine/Equipment

The Contractor provides all the necessary labour, skills, and tools/equipment to conduct to execute the required scope of work. All equipment must be in working order. Contractor to conduct calibration tests on all tools/equipment. Contractor to submit valid calibration certificates submitted Employer's approval before commencing with works.

Contractor provides competent and skilled engineering resources with minimum 5 years' power plant work experience post obtaining BSc. /BEng. qualification

Contractor's engineering resources to be accommodated to utilise the Client's Engineering Building as office space to execute the required works.

5.1. Other Requirements

- The Contractor provides personal protective equipment for the engineering resources.
- Contractor shall provide engineering resources capable of conducting standby/emergency call out service 24 hours a day and 7 days a week for the duration of the contract. The Contractor resources adequately to comply with the Basic Condition of Employment Act with regards to working times and rest periods for the durations.
- Technical documentation and tasks are communicated via email.
- The Contractor makes provision for transportation during normal working hours and for emergency/standby call –outs for the duration of specific tasks orders raised. The means of transportation should conform to Procedure 32-93 “Eskom Vehicle and Driver Safety Management Procedure”
- Contractor provides meals and accommodation.

5.2. Civil Engineering tools and Instruments

Civil Engineering tools and instruments for inspections includes but not limited to: -

i. 2x15megapixel Camera
ii. 4xLaser measuring device;
iii. 2xMeasuring wheel;
iv. 4xTape measures
v. 4xDigital callipers
vi. 4xAccess equipment such as sky jacks etc;
vii. Design software programmes

5.3. Process Engineering tools and Instruments

Process Engineering tools and instruments for inspections includes but not limited to: -

i. 2x 15megapixel Camera
ii. 1x Thermal Camera with range to 650 °C
iii. 2x Fluke Thermometer
iv. 1x Flowmeter

6. Quality Control and Assurance

The Contractor shall develop and implement a system for quality verification records, including site investigation Plans, Record Books (Data Books) as specified in the Tutuka Quality Specifications.

As part of the tender submission, Contractor to submit a list of engineering candidates suitable to execute the required works for the Client’s Service Managers to approve and conduct compulsory interview sessions with the individual engineering candidates. If the Tenderer/Contractor does not submit the list of successful engineering candidates, that Tender/Contractor will be disqualified from the tendering process. If the engineering candidates fail to pass the Client’s interviews, Contractor to seek and submit respective list of engineering candidates within 3 days for the Client’s Service Managers to approve and conduct compulsory interview sessions with the individual engineering candidates. Successful engineering candidates to immediately commence with their duties, after Client’s Service Managers have conducted interviews and issued interview results to the Contractor.

- All technical queries to be directed to the Client's Service Managers.
- Tenderer/Contractor to provide returnable schedules in accordance with the technical evaluation strategy issued by the Client [**15ENG GEN-2068**]

7. Configuration Management

7.1. Documentation

All documents supplied by the *Contractor* shall be subject to Eskom's approval. The language of all documentation shall be in English.

In order to portray a consistent image, it is important that all documents generated and used throughout the contract duration follow the same standards of layout, style and formatting as described in the Work Instruction.

8. DOCUMENT RETURNABLES

The contractor shall produce and submit a project plan, project quality plan, organogram, detailed method statement, QCP, safety file for approval prior to the commencement of work. The Contractor to ensure that the Engineering Resources conduct induction and medicals prior to commencement of work.

These documents should contain the following information, which is not limited to: -

- Project Programme: Indication of the different activities applicable for the execution of the required works
- Project Quality Plan: Highlight the activity or standard which shall be used to ensure quality materials and workmanship
- Organogram: Indication of the required Engineering Resources (i.e. Civil, Turbine and Process Engineers.) who will be involved in the execution of the required works. Names and qualifications, together with ID and CV's to be included. This includes list of engineering resources shortlisted by the Contractor and submitted to the Client's Service Managers to conduct individual interviews with the engineering candidates.
- Method Statement: Detailed method statement specifying sequence of activities, skills, labour, materials, tools and testing procedures applicable for the execution of the required work
- QCP: Must indicate relevant hold, surveillance and witness points for the Contractor and Employer

8.1. Programme

As part of the tender submission, Contractor to submit a detailed program in pdf Gantt chart. The project programme to specify the different activities applicable for the execution of the required works

9. Acceptance

This document has been seen and accepted by:

Name	Designation
Nompumelelo Dlamini	Civil Engineering Manager
Wilson Kudiwa	Turbine Engineering Manager
Horatio Schreiner	Process Engineering Manager
Andre Krugel	Engineering Manager(Acting)
Khuthala Ketano	Quantity Surveyor

10. Revisions

Date	Rev.	Compiler	Remarks
01 March 2021	0	N Dlamini	Issue document for review
08 March 2021	1	N Dlamini	Final Document

11. Development Team

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

- Nompumelelo Dlamini
- Wilson Kudiwa
- Horatio Schreiner

12. Acknowledgements

N/A