ESKOM

KOEBERG NUCLEAR POWER STATION

User Requirement Specification

Provision of civil/structural inspections and monitoring of safety and non-safety related structures on an as and when required basis at Koeberg Nuclear Power Station for a period of 5 years.

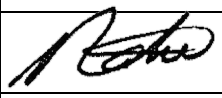
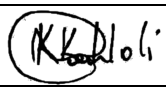
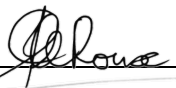
	Name:	Sign:	Date:	Designation:
PREPARED BY:	**M Rahube**		2025/06/05	**Principal Technician**
REVIEWED BY:	**B Francis**		2025/06/05	**Civil Engineer**
REVIEWED BY:	**K Moahloli**		2025/06/05	**Senior Supervisor**
REVIEWED BY:	**J Le Roux**		2025/06/05	**Senior Advisor Quality Assurance**
APPROVED BY:	**L Thomas**		2025-06-05	**I&T Manager**

TABLE OF CONTENTS

1. DESCRIPTION

The Consultant is required to provide civil/structural services according to the employer's in-service inspection programme (ISIPRM) and civil monitoring programme (CMP) at Koeberg Nuclear Power Station (KNPS) for a period of 5 years.

2. BACKGROUND

Inspection & Test Group (I&T) is responsible for the implementation of the civil/structural monitoring and concrete quality control function at KNPS. These requirements are based on the civil monitoring programme in procedure 240-166151023 (KSA-128) and associated procedures, which incorporate the following:

- In-service Inspection Programme Manual (ISIPRM) Module E-L requirements based on ASME XI,
- Specific civil inspections referenced in the Nuclear Installation License (NIL – Variation 19),
- Inspection requirements associated with the Nuclear Safety Related Structures derived from ACI 349.3R and
- Inspection requirements associated with the Construction Regulations, 2014.

The Component Engineering Group is responsible to ensure continuity of the on-going, statutory Responsible Engineer duties and on-going civil\structural engineering support services required at Koeberg.

As part of the before mentioned services, specialist services are also required on an as and when required basis in order to execute the civil monitoring programme for specific inspections, these include the following:

- Geologists
- Surveyors
- Seismologists
- Accredited laboratory services
- Qualified Abseilers

The civil/structural monitoring inspections for civil monitoring programme are schedules in detailed in procedures 240-166149425 (KAU-029) and 240-166148961 (KAU-030).

The required services are critical to KNPS to ensure compliance to the Nuclear Installation License and Statutory requirements. Failure to comply with these requirements may constitute violations of the Nuclear License and statutory code requirements/conditions. KNPS issues periodic reports to the National Nuclear Regulator (NNR) on all the civil/structual safety related structures\components of the work scope

3. SCOPE OF WORK

The Consultant is required to provide certified and qualified personnel to perform civil/structural inspections/surveillances of safety and non-safety related structures (SR and NSR) and during non-outage and outage periods.

The tasks will be executed in accordance with Eskom authorised procedures. These procedures will be supplied.

The work scopes include and are listed under the following categories:

- Detailed civil inspections/surveillances as per 240-166149425 (KAU-029) and 240-166148961 (KAU-030)
- Basic civil Inspections/surveillances (Construction Regulations, 2014)
- Ad-hoc support services
- Provide training (as part of skills transfer) to Eskom civil personnel

Detailed inspections as per 240-166149425 (KAU-029) & 240-166148961 (KAU-030)

The Consultant shall perform all surveillances of the specific license binding, nuclear safety related structures (SR) and non-safety related structures as listed in procedures 240-166149425 (KAU-029) and 240-166148961 (KAU-030), in accordance with the relevant civil (inspection & test) working procedures.

The inspections/surveillances and tests will be performed using the inspection method and level of quality assurance prescribed by the relevant working procedures.

The scope also covers the condition assessment performed on the areas exposed to the external environment of the safety related structures and plant support structures/availability related structures/buildings using supplemental inspection techniques, such as thermal imaging, delamination/hammer survey and chloride testing of the external concrete surfaces/facades.

The results or findings shall be reported as specified by the procedure or as instructed by the Employer as required**.**

Basic inspections (OHSA Construction Regulations, 2014)

The consultant shall perform **annual** inspections of all safety and non-safety related structures to ensure compliance to the OHSA Construction Regulations.
The inspections shall be performed in accordance with the inspections schedule in procedure 240-166149425 (KAU-029). The report format as stipulated in the relevant working procedures shall be followed for all structures.
The reporting of all anomalies shall be in accordance with the relevant procedures or as per the Employer’s request.

Ad-Hoc support services

The Consultant shall provide nuclear civil/structural support services to the civil personnel within Inspection & Test group on an as and when required basis.

The scope of nuclear civil structural ad-hoc support services shall include but not limited to the following:

- Outage related civil/structural support work
- Ad-hoc inspections i.e. concrete waste disposal drums and others as per Employer's instructions.
- Engineering support includes procedures reviews, plant support, specification reviews, modification reviews, design reviews, provide concrete repair solutions/strategies, structural analysis and as per employer's instructions.
- Evaluation of civil/structural related anomalies, failures, and concerns.

Provide training (as part of skills transfer) to Eskom civil personnel

The table below provide details of the proposed training during the duration of the contract and further training request will be as per employer's instructions. Training can be either classroom or plant walkdown. The training modules to be reviewed and agreed by the Eskom civil teams and authorised by Responsible Engineer.

The table below details the training requirements:

Proposed training for Civil Technicians	Objectives	Outcomes
Repair & Rehabilitation of Concrete Structures Steel Corrosion Engineering Course Concrete Degradation and Rehabilitation of Nuclear Power Plant Structures International Concrete Expert Panel for Long Term Repairs to Koeberg Containment Structures Concrete Non-Destructive Evaluation Techniques	To enable learners to be skilled in the mechanisms of concrete degradation and methods of repair.	Learning outcomes to be in accordance with written and practical exams to ascertain competency of learners This will enable I&T to authorize the civil technicians within the I&T process in accordance with I&T authorization procedure KAR-020 These will assist during the compiling/reviews/authorising of specifications for concrete repairs/reports/performing engineering hold points during civil recovery projects.
		Learning outcomes to be in

Containment structures detailed designs and function and basic layout Detailed design of the post tensioning system Containment safety functions All safety related structures (SR) structures basic layout, detailed designs and functions Deterioration of concrete in the marine environment Assessment of structures according to ACI codes Quality control condition assessment inspection training on all SR structures Identification of defects on concrete structures with reference to ASME and ACI codes License binding surveillances i.e. Aseismic Vault bearing inspections, Aseismic Vault-sample bearing torquing, Aseismic sample bearing testing, Containment online monitoring, upper & lower raft topographical survey, Aseismic Vault- crosshole seismic tests, Aseismic Vault-groundwater sampling, Aseismic Vault- soil cement sample tests, how to perform inspections/tests and how to analyse the results.	To enable learners to be skilled in the mechanisms of concrete degradation and methods of repair.	accordance with written and practical exams to ascertain competency of learners This will enable Inspection & Test to authorize the civil technicians within the Inspection & Test process in accordance with Inspection & Test authorization procedure KAR-020 These will assist during the compiling/reviews/authorising of specifications for concrete repairs/reports/performing engineering hold points during civil recovery projects.

4. EQUIPMENT/TOOLS/PERSONNEL

All equipment and tools needed to perform the activities will be transported to and removed from site. Reserve equipment, tooling, spare parts and material must be available on site or be made available within a very short time frame in case equipment breakdowns. The Consultant may not cause work interruption resulting in schedule changes due to his equipment or personnel.

All contaminated equipment brought on site shall comply with the requirements of IAEA TS-R-1 “Regulation for the safe transport of radioactive materials”.

All contaminated equipment transported on or leaving Koeberg site shall comply with the requirements of KAA-634 “Responsibilities for the radioactive material control programme”.

The Consultant evaluates in detail his needs for the whole on site work, to be supplied by Koeberg, such as: hoisting, scaffolding, shielding, tenting, fluid supplies, HVAC connection, storage and lay down areas. The Consultant is responsible of the equipment provided to him by the Employer.

The Consultant shall indicate the support service required from Eskom in his offer.

All tools and equipment are subject to a security screening before they are allowed on the Site. All tools and equipment must be listed and specified before they are brought on Site. This list will serve as evidence for removal permits. Vehicles will only be allowed on Site, if proof is provided to the Employer that there is a requirement that such a vehicle is necessary to complete the works.

KNPS is classified as a national key point.

All personnel must have a valid identification document or passport. All personnel must be cleared to commence any work on the Site by the South African authorities, prior to being cleared as a Temporary worker (Fitness for Duty).

Until clearance is obtained, the personnel are allowed on site only as visitors. Visitors are not allowed to perform any work on site. Security clearance or refusal thereof will not constitute a compensation event.

On a daily routine all personnel will access and leave the Site via the security-controlled access point, where all are subjected to security screening procedures.

All personnel using cameras must be authorised by Eskom. Security must be informed prior to photography. All photos to be given to Eskom and deleted from the Consultant once not required. The Consultant will not disclose any photographs, irrespective of the format, to any third party that does not require it for the purpose of engaging in business with Eskom. The Consultant shall not photograph and security systems or components unless authorized by the security manager.

5. QUALITY REQUIREMENTS

The Consultant shall be ISO 9001:2015 certified.

The Consultant shall be a **Q2** approved supplier as per Procurement Quality Engineering (PQE) assessment for safety related structures and license binding activities.

Quality Assurance and Quality Controls actions may be required for the service as well as a final inspection if so requested.

The on-site work will be managed with a Quality Control Plan with intervention points where required.

The Consultant will submit a Quality Control Management Plan (CQMP) for the duration of the contract, as per 238-102 Rev 3, for acceptance by Eskom. In addition, a Project Plan or Schedule for the works to be performed, online and each outage, will be required and submitted for acceptance by the Eskom Representative.

6. DOCUMENTATION

To be included in the tender:

The Consultant shall describe and provide in his proposal, sufficient information to show conformity to all requirements of this User Requirements Specification (URS).

This includes:

- Description of the specific equipment used for calibration on site.
- List and description of the tooling, equipment, and personnel available (or dedicated) for the inspections, with the current qualification status.
- Description of the organisation on site and of the support from the main office.
- Needs for facilities, offices, power, internet, etc. to be supplied or performed by Koeberg.
- Measure and precaution to guarantee availability of equipment and personnel.
- Organisation with co- and sub-consulting (if relevant).

To be delivered during contract implementation:

- Qualification dossiers (two months before start of the service)
- Inspection quality plans (one month before start of inspections).
- Personnel certification and qualification records (one month before start of inspections).
-

  To be delivered before commencing the work:

- Health and Safety File
- Written Practice for Certification of Authorising Inspectors (Nuclear Safety Structures)
- Up to date staff authorisation file
- Contract Quality Management Plan
- Schedule of civil monitoring programme

It is noted that deliverables shall be task specific as and when required.

All reports and documents supplied to Eskom shall be presented in the format as required in the relevant procedures (tables provided in the working procedures to populate data/results shall be used at all times, as applicable) and these should be provided in both hard copy and electronic format. Electronic copies of text files shall be in '.doc', 'pdf' and drawings in '.dgn' format.

All the reports to be signed by Engineers who are professionally registered with the Engineering Council of South Africa (ECSA).

Deliverables shall be task order specific as and when required. All reports to be submitted with original photographs and original footages (where there are footages).

7. CERTIFICATION/QUALIFICATION OF PERSONNEL

Personnel performing surveillances of civil structures at Koeberg shall be in possession of the following as a mimimum requirements:

- Visual acuity certificate
- National Diploma in Civil Engineering

Personnel performing the inspection of nuclear safety related buildings shall have at least 1 years' experience in the inspection of buildings and structures of a nuclear plant similar to KNPS under the supervision of an authorised inspector.

Training and examinations administered totally or inpart by Consultant or another training institution, shall be formally accepted by the Responsible Engineer for all Nuclear Safety Related Structures.

All Nuclear Safety Related (SR) structure training shall be performed by a professional civil engineer or a designated expert for training.

The qualification, training and certification requirements applicable to the inspection personnel engaged in the following inspection activities, are detailed below.

Safety Related Structures (excluding Containment)

Personnel performing detailed and basic surveillances on nuclear safety related structures shall be approved by the Responsible Engineer and shall be qualified by satisfying the following requirements:

At least 1 year's plant experience, such as that gained by plant personnel involved in inspection, maintenance, or repair/replacement activities in the following:

- Structural concrete and reinforcing steel
- Post-tensioning system components (for plants with post tensioning systems only)
- Structural steel

At least 4 hours of training which will include basic information on the following:

- Understanding of the deterioration of concrete in the marine environment

- Principals of performing a condition assessment of structures according to ACI 349.3R
- Identification of defects in concrete structures with reference to ACI 201.1R-08
- Basic understanding of the functions of different safety related buildings on the Koeberg plant

A practical examination using test specimens / test areas on the plant with defects, flaws or indications to be detected by the following visual examination techniques:

- General and detailed visual examination of concrete
- Detailed visual examination of reinforcing steel

Passing grades for visual examinations shall be as follows:

- An average combined grade of 80% for written and practical examinations
- A minimum grade of 70% for each examination (written and practical)
- Individuals failing to attain the required passing grades shall receive additional training as determined by the Responsible Engineer before re-examination. The written re-examination questions shall be approved by the responsible engineer. No individual shall be re-examined more than twice within any consecutive 12-month period.

Training proficiency shall be demonstrated by administering subsequent examinations at a frequency not exceeding 5 years or as inspection requirements contained in ACI 349.3R are revised.

<u>Containment Structures</u>

Personnel performing detailed surveillances on safety related structures shall be approved by the Responsible Engineer and shall be qualified by satisfying the following requirements:

At least 1 year's plant experience, such as that gained by plant personnel involved in inspection, maintenance, or repair/ replacement activities in the following:

- structural concrete and reinforcing steel
- post-tensioning system components (for plants with post-tensioning systems only)
- structural steel

At least 4 hours of training in ASME Section XI, Subsection IWL requirements and at least 2 hours of training in plant specific procedures for IWL visual examinations. Training shall include requirements for in-service and pre-service examinations and reporting criteria for:

- concrete (conditions as described in ACI 201.1 should be included),
- reinforcing steel and

- post-tensioning system items (e.g., wires, strands, anchorage hardware, corrosion protection medium, and free water) [for plants with post-tensioning systems only].

Training shall also include the following:

- Understanding of the deterioration of concrete in the marine environment
- Principals of performing a condition assessment of structures according to ACI 349.3R
- Identification of defects in concrete structures with reference to ACI 201.1R-08
- Basic understanding of containment safety functions
- Basic Understanding of the functions of different safety related buildings on the Koeberg plant
- Basic understanding of containment design of KNPS
- Basic design of the prestressing system
- Physical design features of the Koeberg containment structures
- Basic layout of the internal structures of the Koeberg containment buildings

ASME XI IWL training proficiency shall be demonstrated by administering a qualification examination consisting of the following:

A written examination covering Section XI, Subsection IWL requirements and plant specific procedure requirements for visual examination containing at least 15 questions in each of the following:

- Concrete and reinforcing steel
- Post-tensioning system components (e.g. wires, strands, anchorage hardware, corrosion protections medium and free water) [for plants with post-tensioning systems only.]

A practical examination using test specimens / test areas on the plant with defects, flaws or indications to be detected by the following visual examination techniques:

- General and detailed visual examination of concrete
- Detailed visual examination of reinforcing steel
- Detailed visual examination of post-tensioning system components

Passing grades for visual examinations shall be as follows:

- An average combined grade of 80% for written and practical examinations
- A minimum grade of 70% for each examination (written and practical)
- Individuals failing to attain the required passing grades shall receive additional training as determined by the Responsible Engineer before re-examination. The written re-examination questions shall be approved by the Responsible Engineer**. No individual shall be re-examined more than twice within any consecutive 12-month period.**

Training proficiency shall be demonstrated by administering subsequent examinations at a frequency not exceeding 5 years or as inspection requirements contained in 240-166150229 (KAA-671), 240-166150507 (KAA-672), 240-166149425 (KAU-029) and 240-166148961 (KAU-030) (originating from ASME XI and ACI 349.3R).

Detailed and Basic non-Safety Related (NSR) Inspections

Personnel performing surveillances of civil structures at Koeberg shall be in possession of the following as a mimimum requirement:

- Visual acuity certificate
- National Diploma in Civil Engineering

Personnel performing the inspection of non-safety and availability related buildings and structures shall have at least 3 months of on-job training by authorised inspectors before being eligible to perform these inspections.

Training and examinations administered totally or inpart by Consultant or another training institution, shall be formally accepted by the Responsible Engineer or a professional ECSA registered civil engineer or a designated expert.

The qualification, training and certification requirements applicable to the inspection personnel engaged in the following inspection activities, are detailed below.

Personnel performing the inspections of NSR related buildings shall at least meet the following criteria:

- Visual acuity certificate
- National diploma in civil engineering
- 100 hours of on-job training in the inspection of buildings, structures and compilation of inspection reports on the civil structures and bulidings under the supervision of a senior inspector qualified under this procedure.
- Co-compiled at least 10 inspection reports for buildings and structures under the supervision of a senior inspector qualified under the Consultant's "Written Practice".

Personnel performing quality control inspections and verifications of specific concrete works related to a project specific specification or a quality control plan, shall at least meet the following criteria:

- Visual acuity certificate
- National diploma in civil engineering
- 2 hours training in the project specification and specific quality control plans associated with the project, performed by the Professional Engineer responsible for the project, or a designated specialist appointed to oversee quality control activities.
- 4 hours of on-job training in performing quality control duties on the specific site using the applicable quality control plan.

VISION CERTIFICATION

a) Individuals shall maintain a valid vision test.

b) The vision test shall be administered annually.

c) Personnel shall demonstrate natural or corrected near-distance acuity of 20/25 or greater Snellen fraction, with at least one eye, by reading words or identifying characters on a near-distance test chart, such as a Jaeger chart. Equivalent measures of near-distance acuity may be used.

d) Personnel shall demonstrate the capability to distinguish the colours applicable to the NDE methods for which certified and to differentiate contrast between these colours.

e) A Near-Distance Test Chart Qualification shall be performed in accordance with the applicable ASME Section XI requirements.

Note: Rope access technicians shall be level 1, 2 and 3 as specified in the Construction Regulations.

Inspector Re-Qualification

Civil Inspectors shall be re-qualified every 5 years or as inspection requirements contained in procedures 240-166150229 (KAA-671), 240-166150507 (KAA-672), 240-49425 (KAU-029) and 240-166148961 (KAU-030). However, the vision test shall be performed annually.

Qualification Records

A training and qualification file shall be maintained as a record for all inspection personnel. This file shall contain, as a minimum the following:

- name of individual
- education qualification
- educational background and experience records
- evidence of satisfactory completion of training
- vision test results
- evidence of successful completion of examinations
- evidence of examination grades
- qualification obtained dates
- qualification expiry dates
- name and signature of Responsible Engineer,

Proof of training, examination results and experience shall be documented in line with the Consultant Written Practice.

8. TIMING AND PLANNING

The contract is to commence on the 01 February 2026 and end on the 31 January 2031.

The service is required for outage and non- outage periods. Only outages that will be within the contract period will be implemented and executed by this contract.

Outage working times:
07h00 to 19h00 - day shift (or as requested by Employer)
19h00 to 07h00 – night shift (or as requested by Employer)

It may be required that overtime be worked which will be communicated to the Consultant.

Working times during non-outage periods:

07h30 to 16h35 (Mondays to Thursdays)
07h30 to 13h30 (Fridays) no lunch break.

9. TRAINING WORKSHOPS AND TECHNOLOGY TRANSFER

9.1 Generic Training

Prior to the commencement of any intrusive work on site, the selected Consultant and the personnel appointed to perform the work are required to complete the following training.

Staff brought on site shall complete the following *Consultant* induction FFD (fitness for duty) Program:

- Enrolment on the FFD system
- Security Screening **-** Police clearance from country of origin to be obtained by the contractor before arriving on site
- Substance abuse testing
- Plant Induction Training
- Radiation Workers training course (initial or requalification)
- Human Performance Training
- Medical examination - to be performed by contractor before arriving on site
- Safety Induction Course
- ALARA Induction Course
- Confined Space Training
- Foreign Material Exclusion (FME) Training

- Working at Heights – to be performed by contractor before arriving on site

Note: The inspectors conducting delamination/ hammer survey by means of abseiling shall complete the Working at Heights training and associated training to ensure complete compliance in terms of the Occupational Health and Safety Act 1993 and the Construction Regulations.

9.2. **Supplier development, localization, and Industrialization (SDL & I)**

The details of the number of resources to be included in the contract condition. A quarterly report to be provided to the Employer.

10. ITEMS TO BE SUPPLIED BY THE EMPLOYER

Eskom shall make available all relevant information (specifications, drawings, previous inspection history, etc.) pertaining to the work. None of the information provided to the Consultant shall be copied in any form and shall be returned to Eskom on completion of the work.
Eskom shall provide the Consultant and his representative with the relevant access to perform the work, provided Eskom is given adequate notification of such requirement.

Note: The Consultant personnel to sign the NDA (Non-Disclosure Agreement) prior working on these documents.

11. EQUIPMENT TO BE SUPPLIED BY THE CONSULTANT

The Consultant shall supply the necessary equipment to conduct the inspections in accordance with the referenced procedures. The Consultant shall supply his staff with the necessary PPE i.e. hard hats, safety shoes, eye protection, and hearing protection.
The Consultant shall ensure that the PPE he supplies meet the required SANS standards or equivalent.

12. CATEGORIES OF LABOUR REQUIRED

The Consultant and his representatives appointed to perform the work shall be competent in the field for which they are appointed. The Consultant and his representatives shall be professionally registered (in terms of Act Nº 46 of 2000).

The inspection personnel who will be performing the monitoring and quality control surveillances shall be eligible to be qualified and certified in accordance with qualification requirements documented in section 7 above. Valid authorisations of all personnel shall be maintained for the duration of the contract.
The Consultant is to provide Eskom with a list of similar projects demonstrating his competency and experience. Eskom reserves the right to examine the certification of appointed personnel. The Consultant must ensure that all staff is qualified and certified. In the event of the Consultant supplying staff, that does not meet the requirements, Eskom reserves the right to cancel the contract

All staff must be able to communicate in English.

13. REFERENCES

240-166151023 (KSA-128): Civil Ageing Management Programme Standard

240-166150229 (KAA-671): Management of Licence Binding Civil monitoring programme Surveillances at Koeberg Nuclear Power Station

240-166150507 (KAA-672): Management of Non-Licence Binding Civil monitoring programme Surveillances at Koeberg Nuclear Power Station

240-166149425 (KAU-029): Basis and Scope for Non-License Binding Civil Surveillances at Koeberg Nuclear Power Station

240-166148961 (KAU-030): Basis and Scope for License Binding Civil Surveillances at Koeberg Nuclear Power Station

RD-0034: Quality and safety management requirements for nuclear installations

238-102 Rev 3: Quality and Safety Management Requirements for Nuclear Suppliers Level 2

IAEA Safety standards: TS-R-1: Regulation for the safe transport of radioactive materials

KAA-634: Responsibilities for the radioactive material control programme