# PART 3: SCOPE OF WORK

| Document reference | Title | No of pages |
|---|---|---|
| | This cover page | 1 |
| C3.1 | *Employer*'s Works Information | 42 |
| C3.2 | *Contractor's* Works Information | |
| | Total number of pages | |

# C3.1: *EMPLOYER*'S WORKS INFORMATION

## Contents

**Part 3: Scope of Work** ..... **1**
**C3.1: *Employer*'s works Information** ..... **2**
**1 Description of the *works*** ..... **6**
1.1 Executive overview ..... 6
1.2 *Employer*'s objectives and purpose of the *works* ..... 6
1.3 Interpretation and terminology ..... 6
**2 Management and Start up** ..... **10**
2.1 Management Meetings ..... 10
2.1.1 Kick Off Meeting ..... 10
2.1.2 Site Demonstration ..... 10
2.1.3 Progress Meetings ..... 10
2.1.4 Design Review Meetings ..... 10
2.1.5 Ad-hoc Meetings ..... 11
2.1.6 Meetings of a Specialist Nature ..... 11
2.2 Documentation control ..... 12
2.3 Health and Safety Risk Management ..... 12
2.3.1 General Health and Safety ..... 12
2.3.2 Safety of Workers ..... 13
2.3.3 Fire Protection ..... 13
2.3.4 Asbestos ..... 14
2.3.5 First Aid ..... 14
2.3.6 Hazardous Substances ..... 14
2.3.7 Radiation Protection ..... 14
2.3.8 Barricading ..... 14
2.3.9 Housekeeping ..... 14
2.3.10 Radiographic Examinations ..... 14
2.3.11 Plant Safety Regulations ..... 15
2.3.12 Occupational Hygiene Requirements ..... 15
2.4 Environmental constraints and management ..... 15
2.5 Quality assurance requirements ..... 16
2.5.1 General ..... 16
2.5.2 Quality Responsibility ..... 17
2.5.3 Inspections ..... 17
2.5.4 Non Conformances and Defects ..... 17

2.5.5 Quality Reporting ..... 17
2.6 Programming constraints ..... 18
2.6.1 General ..... 18
2.6.2 Computerised Planning ..... 18
2.6.3 Planning Programmes ..... 18
2.7 *Contractor's* management, supervision and key people ..... 19
2.8 Invoicing and payment ..... 20
2.9 Insurance provided by the *Employer* ..... 21
2.10 Contract change management ..... 21
2.11 Provision of bonds and guarantees ..... 21
2.12 Training workshops and technology transfer ..... 21
**3 Engineering and the *Contractor's* design ..... 22**
3.1 *Employer*'s Design ..... 22
3.1.1 Specific Requirements ..... 22
3.1.2 Units Selection and Language ..... 24
3.1.3 Symbols ..... 24
3.1.4 Matters on which the Works Information is Silent ..... 24
3.1.5 Meetings ..... 24
3.1.6 Design Review ..... 24
3.1.7 Installation and Commissioning Methodology ..... 24
3.1.8 Project Milestones ..... 25
3.1.9 Completion and Take Over ..... 25
3.1.10 Working Hours ..... 26
3.1.11 Shutdown/Outage Coordination ..... 26
3.1.12 Loss Prevention ..... 26
3.1.13 Equipment Specifications ..... 28
3.1.14 Acceptance Testing & Inspection ..... 28
3.1.15 Training ..... 28
3.1.16 Warranty ..... 29
3.1.17 Support ..... 29
3.1.18 Calibration, Maintenance & Spares ..... 29
3.1.19 Software Licensing ..... 29
3.1.20 Documentation, Drawings & Manuals ..... 29
3.2 Parts of the *works* which the *Contractor* is to design ..... 30
3.3 Procedure for submission and acceptance of *Contractor's* design ..... 31
3.4 Other requirements of the *Contractor's* design ..... 32
3.5 Use of *Contractor's* design ..... 32
3.6 Design of Equipment ..... 32
3.7 Equipment required to be included in the *works* ..... 32
3.8 As-built drawings, operating manuals and maintenance schedules ..... 32

**4 Procurement ..... 33**
4.1 People ..... 33
4.1.1 Minimum requirements of people employed on the Site ..... 33
4.1.2 BBBEE and preferencing scheme ..... 33
4.1.3 Accelerated Shared Growth Initiative – South Africa (ASGI-SA) ..... 33
4.2 Subcontracting ..... 33
4.2.1 Preferred Subcontractors ..... 33
4.2.2 Subcontract documentation, and assessment of subcontract tenders ..... 33
4.2.3 Limitations on subcontracting ..... 34
4.2.4 Attendance on Subcontractors ..... 34
4.3 Plant and Materials ..... 34
4.3.1 Quality ..... 34
4.3.2 Plant & Materials provided “free issue” by the *Employer* ..... 35
4.3.3 *Contractor’s* procurement of Plant and Materials ..... 35
4.3.4 Spares and consumables ..... 35
4.4 Tests and inspections before delivery ..... 36
4.5 Marking Plant and Materials outside the Working Areas ..... 36
4.6 *Contractor’s* Equipment (including temporary works) ..... 36
4.7 Cataloguing requirements by the *Contractor* ..... 36
**5 Construction ..... 37**
5.1 Temporary works, Site services & construction constraints ..... 37
5.1.1 *Employer*’s Site entry and security control, permits, and Site regulations ..... 37
5.1.2 Restrictions to access on Site, roads, walkways and barricades ..... 37
5.1.3 People restrictions on Site; hours of work, conduct and records ..... 37
5.1.4 Health and safety facilities on Site ..... 38
5.1.5 Environmental controls, fauna & flora, dealing with objects of historical interest ..... 38
5.1.6 Title to materials from demolition and excavation ..... 38
5.1.7 Cooperating with and obtaining acceptance of Others ..... 38
5.1.8 Publicity and progress photographs ..... 38
5.1.9 *Contractor’s* Equipment ..... 38
5.1.10 Equipment provided by the *Employer* ..... 39
5.1.11 Site services and facilities ..... 39
5.1.12 Facilities provided by the *Contractor* ..... 41
5.1.13 Existing premises, inspection of adjoining properties and checking work of Others ..... 41
5.1.14 Survey control and setting out of the works ..... 41
5.1.15 Excavations and associated water control ..... 41
5.1.16 Underground services, other existing services, cable and pipe trenches and covers ..... 41
5.1.17 Control of noise, dust, water and waste ..... 41
5.1.18 Sequences of construction or installation ..... 42
5.1.19 Giving notice of work to be covered up ..... 42

5.1.20 Hook ups to existing works ..... 42
5.2 Completion, testing, commissioning and correction of Defects ..... 42
5.2.1 Work to be done by the Completion Date ..... 42
5.2.2 Use of the works before Completion has been certified ..... 42
5.2.3 Materials facilities and samples for tests and inspections ..... 42
5.2.4 Commissioning ..... 42
5.2.5 Start-up procedures required to put the works into operation ..... 43
5.2.6 Take over procedures ..... 43
5.2.7 Access given by the *Employer* for correction of Defects ..... 43
5.2.8 Performance tests after Completion ..... 43
5.2.9 Training and technology transfer ..... 43
5.2.10 Operational maintenance after Completion ..... 43
**6 Plant and Materials standards and workmanship ..... 44**
6.1 Investigation, survey and Site clearance ..... 44
6.2 Building works ..... 44
6.3 Civil engineering and structural works ..... 44
6.4 Electrical & mechanical engineering works ..... 44
6.5 Process control and IT works ..... 44
**7 List of drawings ..... 45**
7.1 Drawings issued by the *Employer* ..... 45
**C3.2 *Contractor's* Works Information ..... 46**

# 1 Description of the *works*

## 1.1 Executive overview

The works require the provision of a system that will continuously and automatically measure, monitor, and display the geomagnetically induced currents (GIC) and the magnetic field (B-field) at selected sites on the Eskom network and shall herein be referred to as the Real Time Monitoring (RTM) system. It is desirable that the RTM system must be mobile or temporary installation.

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

As part of the Eskom Resilience Program, a Geomagnetic Disturbances (GMD) Joint Working Group (JWG) was established to assess the resilience of Eskom against the possible disaster of GMDs (listed as priority 2) and make recommendations on managing and mitigating against it.

As part of achieving its objectives, the GMD JWG has identified the need to have real time monitoring of solar storms intensity which will assist in making adequate recommendations and designing of fit for purpose resilience programs and practices. The RTM system requires devices that are not standard in Eskom. The intention is to have the RTM system operational before the major solar storm of 2025.

The progress and outcomes of the GMD JWG is supported and being tracked by the Eskom Transmission Executive Committee (TEXCO).

## 1.3 Interpretation and terminology

**Disaster:** Means a progressive or sudden, widespread or localised, natural or human-caused occurrence which-

1. causes or threatens to cause:
   a. death, injury or disease;
   b. damage to property, infrastructure or the environment; or
   c. significant disruption of the life of a community; and
2. is of a magnitude that exceeds the ability of those affected by the disaster to cope with its effects using only their own resources;

**Geomagnetic Disturbances Disaster:** Refers to the condition when the electricity network moves out of its steady state condition because of solar (geomagnetic) storms causing loss of critical plant equipment (e.g., power transformers) and/ or control of the plant, thereby resulting in voltage instability.

**Mobile or Temporary Installation:** Refers to an installation that has the ability to be disconnected after use at a specific site and recreate the set-up and connections at various sites, by transporting equipment in a van/light truck or in a trailer.

The following abbreviations are used in this Works Information:

| Abbreviation | Meaning given to the abbreviation |
|---|---|
| **A** | Ampere |
| **AC** | Alternating Current |
| **B-field** | Magnetic Field |
| **COC** | Certificate of Compliance |

| Abbreviation | Meaning given to the abbreviation |
|---|---|
| **CPA** | Cost Price Adjustment |
| **CPR** | Cardio-Pulmonary Resuscitation |
| **CSV** | Comma Separated Values |
| **CQP** | Completed Quality Process |
| **CV** | Curriculum Vitae |
| **D** | Direction |
| **DOL** | Department of Labour |
| **ECC** | Engineering Construction Contract |
| **EOD** | Electrical Operating Desk |
| **FAT** | Factory Acceptance Testing |
| **FSS** | Finance Shared Services |
| **g** | Acceleration due to gravity on the surface of the earth |
| **GIC** | Geomagnetically Induced Current |
| **GMD** | Geomagnetic Disturbance |
| **GPRS** | General Packet Radio Service |
| **GR** | Goods Receipt |
| **HTTPS** | Hypertext Transfer Protocol Secure |
| **ID** | Identity |
| **IEC** | International Electrotechnical Commission |
| **IEEE** | Institute of Electrical and Electronics Engineers |
| **IP** | Ingress Protection |
| **ISO** | International Organisation for Standardisation |
| **ITP** | Inspection and Test Plan |
| **Km/h** | Kilometers per hour |
| **kV** | Kilovolt |
| **LTD** | Limited |

| Abbreviation | Meaning given to the abbreviation |
|---|---|
| **NATO** | No test order |
| **NCR** | Non-conformance Report |
| **NEC** | New Engineering Contract |
| **NEMA** | National Environmental Management Act |
| **NEMWA** | National Environmental Management Waste Act |
| **OEM** | Original Equipment Manufacturer |
| **OH** | Occupational Health |
| **OHS** | Occupational Health and Safety |
| **ORHVS** | Operating Regulations on High Voltage Systems |
| **PDF** | Portable Document Format |
| **QA** | Quality Assurance |
| **QC** | Quality Control |
| **QCP** | Quality Control Plan |
| **QMS** | Quality Management System |
| **RTM** | Real Time Monitoring |
| **SABS** | South African Bureau of Standards |
| **SANS** | South African National Standards |
| **SAT** | Site Acceptance Testing |
| **SHE** | Safety, Health, Environmental |
| **SHEQ** | Safety, Health, Environmental, Quality |
| **SI-units** | International System of Units |
| **SOC** | State Owned Company |
| **T** | Tesla |
| **TEXCO** | Transmission Executive Committee |
| **USB** | Universal Serial Bus |
| **VAT** | Value Added Tax |

# 2 Management and Start up

## 2.1 Management Meetings

Meetings will be held between the *Employer*, the *Contractor* and any other co-opted members. The *Contractor* will be represented at each meeting by appropriate members of its staff. All meetings will be chaired by the *Project Manager*.

The venue for these meetings will be as determined by the *Project Manager*. The *Project Manager* will prepare and issue the minutes of these meetings.

Any action(s) of the *Project Manager*, *Supervisor*, *Contractor* and Adjudicator implied in the minutes of meetings with contractual implications will be confirmed by a separate communication given in accordance with this Works Information.

### 2.1.1 Kick Off Meeting

Kick-off meeting will be held within 1 week after the award of the contract. This meeting will cover Project implementation, the Scope of work, and Schedule. This will give the *Contractor* an opportunity to discuss all matters related to carrying out their responsibilities.

### 2.1.2 Site Demonstration

Shortly after award of the contract, a site visit by the *Employer* to any one of the *Contractor's* existing operational RTM systems or similar operational installations (if available) will be undertaken. This will give the *Employer* the opportunity to assess and understand the *Contractor's* capabilities.

### 2.1.3 Progress Meetings

Weekly progress meetings will be held covering progress to date on the execution of the scope of works, and all associated risks, risk impact and risk mitigation.

The *Contractor* will be required to report overall progress and as a minimum requirement, the following shall be addressed:

1. *Contractor's* current activity progress and planned completion dates
2. *Contractor's* to report on all items listed in the NEC core clause, 31
3. *Contractor's* and *Project Manager's* programme agenda compared for problematic differences
4. Current and projected manpower
5. Health, safety and quality management
6. Progress on any other relevant activities
7. Discuss any technical or commercial issues
8. Project risks, problem areas or concerns

### 2.1.4 Design Review Meetings

The *Contractor* shall present the Design to the *Employer* for technical review along with all relevant drawings.

A design review in a planned exercise is envisaged to ensure that there is a common understanding of the applicable standards and specification requirements, and to provide an opportunity to scrutinize the design to ensure the requirements meet the *Employer*'s requirements.

During this meeting, the comments of the *Employer* on the design will be reviewed and discussed in detail to finalize the design for the RTM system. The *Contractor's* installation and commissioning methodology will reviewed as part of the design review.

The minutes of the meeting shall be prepared by the *Project Manager*.

### 2.1.5 Ad-hoc Meetings

Ad-hoc meetings to discuss any matters related to the execution of the scope of work on an as-and-when required basis upon request from the *Employer* or the *Contractor*.

### 2.1.6 Meetings of a Specialist Nature

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.

A summary of the planned meetings is provided in Table 1.

**Table 1: Planned meetings**

| Title and purpose | Approximate time & interval | Location | Attendance by: |
|---|---|---|---|
| **Kick off meeting**: Covering Project implementation, the Scope of work, and Schedule. This will give The *Contractor* an opportunity to discuss all matters related to carrying out their responsibilities. | Once-off, shortly after award of the contract. Date, time and duration to be confirmed upon award of contract. | Eskom Research, Testing & Development Offices, Lower Germiston Road, Rosherville, | *Employer*, *Supervisor*, *Contractor* and others as determined by the *Project Manager*. |
| **Site demonstration:** A site visit by the *Employer* to any one of the *Contractor's* existing operational RTM systems or similar operational installations (if available) will be undertaken. Once-off shortly after award of the contract | Once-off, shortly after award of the contract. Date, time and duration to be confirmed upon award of contract. | *Contractor's* existing operation RTM system installation or similar operational installation. Details to be confirmed by *Contractor*. | *Employer*, *Supervisor*, *Contractor* and others as determined by the *Project Manager*. |
| **Design review meetings:** Technical review of the *Contractor's* RTM system design, and installation and commissioning methodology | Frequency, date and time to be confirmed during kick-off meeting. | Remotely via Microsoft Teams or in-person at Eskom Research, Testing & Development. | *Employer*, *Supervisor*, *Contractor* and others as determined by the *Project Manager*. |
| **Progress meetings:** Covering progress to date on the execution of the scope of works, and all associated risks, risk impact and risk | Weekly. Day, time and duration to be confirmed and agreed upon at kick off meeting. | Remotely via Microsoft Teams or in-person at Eskom Research, Testing & Development. | *Employer*, *Supervisor*, *Contractor* and others as determined by the *Project Manager*. |

| Title and purpose | Approximate time & interval | Location | Attendance by: |
|---|---|---|---|
| mitigation. | | | |
| **Adhoc meetings** | As-and-when required. Date, time and duration to be confirmed. | Remotely via Microsoft Teams or in-person at Eskom Research, Testing & Development | *Employer*, *Supervisor*, *Contractor* and others as determined by the *Project Manager*. |
| **Meetings of Specialist Nature** | As-and-when required. Date, time and duration to be confirmed. | Remotely via Microsoft Teams or in-person at Eskom Research, Testing & Development | *Employer*, *Supervisor*, *Contractor* and others as determined by the *Project Manager*. |

## 2.2 Documentation control

1. The documentation requirements cover the various engineering stages, from the design through to the supply, installation, testing, commissioning, training and support stages of the project, as indicated in this document.
    a. Site inspections report
    b. Design
    c. Design review and acceptance
    d. Installation and commissioning methodology
    e. Acceptance testing of prototype
    f. Training proposals (practical and theoretical training), training material and certificates
    g. Site acceptance testing
    h. Equipment specifications
    i. Calibration certificates
    j. Frequency of calibrations and maintenance with annual cost projection thereof
2. The *Contractor* is responsible for the compilation and the supply of the documentation during the various project stages and to provide the documentation programme to link with the milestone dates.
3. The *Employer* will provide the *Contractor* with the email address that will be used for all contractual documentation / communications from and to the *Contractor*.
4. The *Contractor* will be expected to have a register and filed copies of all contractual documents.
5. Documentation as outlined in section

## 2.3 Health and Safety Risk Management

The *Contractor* and his employees shall comply with Eskom policies, standards, procedures, other statutory regulatory requirements and specifications.

### 2.3.1 General Health and Safety

1. The *Contractor* shall comply with, but not limited to, the following:

    a. Occupational Health and Safety Act no. 85 of 1993 and its Regulations (OHS Act),
    b. Disaster Management Act, no 57 of 2002.
    c. Safety, Health and Environmental Requirements contained in the SHE Specifications for *Contractor*s, (latest revision) as attached in this Works Information.
    d. Eskom SHEQ Policy, Standards, Procedures, Guidelines, Specifications and Regulations as listed below and are attached in this Works Information:

    - Eskom Safety, Health, Environmental and Quality Policy: 32-727
    - Eskom Life Saving Rules, Directive: 32-421
    - Eskom Procedure on Smoking: 32-36
    - Eskom Incident Management Procedure 32-95 (latest revision)
    - Implementation of Occupational Hygiene management programme, Standard 240-42262670
    - Eskom Life Saving Rules, Directive: 240- 62196227
    - Eskom vehicle and driver safety management 32-93

- Eskom vehicle specification 32 – 345
- Eskom *Contractor* Health and Safety requirements standards 32-136
- Employees' right of refusal to work in an unsafe situation 240-43848327
- Eskom Waste Management Standard 32-245
- Annexure B: Acknowledgement Form for Eskom SHE Rules and other Requirements

2. The *Contractor* shall request all applicable Eskom procedures & requirements. The *Contractor* shall always ensure safety awareness through continuous training. The *Contractor* always will be responsible for the supervision of his employees, agents, Sub-*Contractor*s and takes full responsibility and accountability for ensuring they are competent, compliant, and aware of the legal requirements and other requirements and execute the Works accordingly.

3. The *Contractor* shall ensure that all statutory appointments and appointments required by any Eskom Regulations are in writing and that all appointees fully understand their responsibilities and are trained and competent to execute their duties.

4. The *Employer*, or any person appointed by the *Employer*, may, at any stage during the term of contract:

   a. Conduct health and safety audits by a competent person regarding all aspects of compliance with the SHEQ Requirements, at any off-site place of work, or the site establishment of the *Contractor*.
   b. Refuse any employee, Sub-*Contractor*, or agent of the *Contractor* access to the premises if such person is found to commit an unsafe act or any unsafe working practice or is found not to be competent or authorised.
   c. Issue the *Contractor* with a stop order should the *Employer* become aware of any unsafe working practice or condition or any non-compliance.

5. The *Contractor* shall immediately report any incidents, disabling injury, near miss, first aid incident as well as any threat to health or safety of which it becomes aware at the Works or on the Site to the *Project Manager*.

6. The *Contractor* agrees that the *Employer* is relieved of any and all of its responsibilities and liabilities in terms of Occupational Health and Safety Act no 85 of 1993 in respect of any acts or omissions of the *Contractor*, and the *Contractor's* employees, agents or Sub-*Contractor*s, to the extent permitted by the Occupational Health and Safety Act no 85 of 1993.

7. The Principal *Contractor* is an *Employer* in its own right, and therefore is required to comply with all regulations and laws imposed on the *Employer* by legislation.

8. The *Contractor* shall organise site safety meetings as per the Eskom SHE specification requirements. (Safety, Health and Environmental Requirements for *Contractor*s).

### 2.3.2 Safety of Workers

1. The *Contractor* ensures the safety of all persons working in the Site. Any hot work including welding will be applied for in accordance with a permit to work system. No welding will be allowed on site unless hot work permit is granted in writing.

2. The *Contractor* ensures that all welding, flame cutting and grinding work is properly screened to protect persons from arc flashes or eye injuries. Fire blankets shall be fitted over the scaffolding planks and platforms. Precautions shall be taken to prevent any objects, welding or grinding splatter from falling.

### 2.3.3 Fire Protection

1. The *Contractor* ensures that adequate firefighting apparatus are provided at all his work sites, and that his employees are trained in the use of this apparatus.

2. The *Contractor* takes precautions to prevent any occurrence of fires or explosions while carrying out any work near flammable gas and liquid systems. Any tampering with the *Employer*'s fire equipment is strictly forbidden.

3. All exit doors, fire escape routes, walkways, stairways, stair landings and access to electrical distribution boards shall be kept free of obstruction, and not be used for work or storage at any time. Firefighting equipment shall remain always remain accessible.

4. In case of a fire, the *Contractor* reports the location and extent of the fire to the Electrical Operating Desk (EOD) using the Emergency Numbers. The *Contractor* shall take the necessary action to safeguard the area to prevent injury and spreading of the fire.

### 2.3.4 Asbestos

1. The *Contractor* does not disturb any thermal insulating material on the plant until it has been positively identified as not containing asbestos and obtain approval written from the *Project Manager* before any thermal insulation is disturbed.

2. All stripping of asbestos material is undertaken strictly in accordance with the *Employer*'s Standard, available from Safety Risk Management.

3. The *Contractor* is obliged to ascertain from the *Project Manager* in advance whether areas required to be stripped, are non-asbestos areas.

### 2.3.5 First Aid

The *Contractor* provides First Aid service to his employees and Sub-*Contractor*s. In the case of severe or serious injury, the *Employer*'s Medical Centre and facilities may be available during normal working hours. The *Employer* recovers the costs incurred, in the use of the above *Employer*'s facilities, from the *Contractor*.

### 2.3.6 Hazardous Substances

The *Contractor* manages hazardous substances in accordance with the requirements of Occupational Health and Safety Act no 85 of 1993, Regulation for Hazardous Chemical Agents and NEMWA Act. The *Contractor* shall declare all hazardous chemical substances brought to Site to the *Employer*.

### 2.3.7 Radiation Protection

The *Contractor* complies with Eskom procedure and legislative requirements when performing any industrial radiography. No radiation activities will be allowed on site unless work permit is granted in writing.

### 2.3.8 Barricading

Access to danger zones is restricted using handrail type guards of at least 1,2 meters high and able to block access to the danger zone. Symbolic safety signs depicting 'Danger' and 'No entry' are attached to the guards. This includes access during the taking of X-rays. Danger tapes are not allowed to be used as barricades.

### 2.3.9 Housekeeping

The *Contractor* shall ensure that the Site is 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 Site after the scaffolding has been erected. *Contractor* is responsible for their removal to the designated scrap area on a daily basis.

### 2.3.10 Radiographic Examinations

1. When radiographic tests are carried out in the plant, the danger area is evacuated with the exception only of authorized radiographic workers, and thereafter barricaded. Compliance is with the relevant power station or substation Site Regulations and requirements.

2. The relevant warning signs at the lockout gates are bolt secured and not by wire or any other means, which could be removed while radiographic tests are in progress.

3. The radiographic technicians ensure that all the lockout gates are opened on completion of the tests.

### 2.3.11 Plant Safety Regulations

The *Contractor* shall comply with the *Employer*'s Plant Safety Regulations and obtains the latest copy of the Plant Safety Regulations from the *Project Manager*.

The *Contractor* shall always work under the supervision of Responsible Person that has been assigned by the *Employer.*

### 2.3.12 Occupational Hygiene Requirements

The *Contractor* develops and implement an Occupational Hygiene Management program which include, but not limited to the following:

1. Health risk assessment process and shall have health risk assessment in place;
2. Occupational Hygiene Monitoring strategy;
3. Occupational Hygiene Monitoring Plan
4. Monitoring of all identified Occupational Hygiene stressors (shall do quantification monitoring of the identified stressors)
5. Implementation of recommendations from the occupational hygiene surveys
6. Documentation
7. Awareness & training
8. Link OH monitoring results with the Medical Surveillance program to ensure that the medical examinations are risk-based. The quantification monitoring shall be performed by an Approved Inspection Authority of the *Contractor's* preference.

The *Contractor*, where their employees are exposed to crystalline silica dust, reports to DOL on six monthly basis as per the DOL reporting template.

Copies of all occupational hygiene reports shall be made available to Eskom.

The *Contractor* develops an action plan to close-out all occupational hygiene related findings and recommendations from the OH reports.

The *Contractor* develops and implement the following procedures (where the risk prevails):
1. Hearing conservation program
2. Hazardous Chemical Substances Management Program
3. Respiratory Protective Program
4. Radioactive sources management procedure

## 2.4 Environmental constraints and management

This section covers the requirements for controlling the impact of construction activities on the environment.

The *Contractor* shall construct and/ or implement all the necessary environmental protection measures in each area before any production work will be allowed to proceed. The *Employer* may suspend the Works at any time in terms the Conditions of Contract should the *Contractor*, in the *Employer*'s opinion, fail to implement, operate or maintain any of the environmental protection measures adequately.

Environmental management is concerned not only with the results of the *Contractor's* operations to carry out the Works but also, and most importantly, with the manner in which his operations are carried out. It is thus a requirement that the *Contractor* shall comply with the environmental requirements. The *Contractor* shall comply with all relevant laws, environmental legislation and regulations, conditions of environmental approvals, environmental management plans, and *Employer*s Policies and Procedures.

The *Contractor* shall comply with the environmental criteria and constraints stated in Annexure (SHE specification) Form 74.

The *Contractor* ensures that all goods, services or Works supplied in terms of the Contract comply with all applicable environmental legislation.
The *Contractor* is responsible to keep the work area clean of any rubble. All waste introduced and/or produced on the *Employer*'s premises by the *Contractor* for this contract, is handled in accordance with the minimum requirements for the Handling and Disposal of Hazardous Waste in terms of Government Legislation as proclaimed by the Department of Water Affairs and Forestry and Eskom environmental requirements including Eskom Environmental waste management procedure 32-245.

Where required, the *Employer* provides special colour coded bins for refuse disposal. The *Employer* will empty these bins.

The *Contractor* ensures that all workers under his control strictly adhere to the correct use of refuse bins.

## 2.5 Quality assurance requirements

### 2.5.1 General

The *Contractor* complies with the Eskom Quality Requirements Standards.

1. The *Contractor* and all sub-*Contractor*s to comply with the *Employer*'s quality requirements including those listed in the *Employer*s specification document called "Supplier Quality Management Specification" number 240-105658000
2. Certification to ISO 9001 is a mandatory requirement for this contract. The *Contractor* uses the QMS for all phases of the Project. The *Contractor* provides evidence of a fully implemented QMS within its own organisation. The *Employer* may at his sole discretion carry out an audit on any supplier; sub-supplier's or *Subcontractor's* QMS for acceptance.

The *Contractor* submits the following documents, within 30 days of the Contract Date, to the *Employer* for review and acceptance and prior to the commencement of the works.

1. The *Contractor* will supply the *Employer* with a CQP which will detail the *Contractor's* organisation, quality assurance and quality control procedures within that organisation specific to this project. The CQP must be aligned to, and reference ISO 10005:2005 QMS, guidelines for quality plans and in compliance with the guideline in Supplier Quality Management Specification 240-105658000.
2. The CQP will make reference to the *Contractor's* QMS Procedures to be used in this contract:
    a. The *Contractor's* QMS compliance with the requirements of ISO 9001
    b. *Contractor's* quality manual
    c. *Contractor's* quality procedures
    d. *Contractor's* quality forms and work instructions
    e. *Contractor's* quality system documents referenced in this Works Information

The *Contractor* supplies the *Project Manager* with a QCP or ITP for review and acceptance. The *Contractor* supplies the *Project Manager* with a detailed contract organogram showing the quality personnel to be used in the Contract. The *Contractor* provides CVs of the quality management employees who will be responsible for quality on site.

Quality Management employee's responsibilities include but are not limited to the following:
1. Implementation of the QMS
2. Administration of QA/QC systems
3. Verification of approval status of *Subcontractor's* QCP and procedures
4. On-and -offsite inspections
5. Co-ordination, inspection and verification of the *Employer*'s intervention points
6. Review of *Contractor* testing and inspection documents (procedures, test results)
7. Reporting on quality performance

The *Contractor* submits as a minimum the following documents, as required by the *Employer*, which requirement does not constitute a compensation event, during the execution of the Works:

1. Updated QCP register
2. Inspection notifications accompanied by their inspection report
3. Non-conformance and Defects registers and reports
4. Updated Site and off site inspection schedules.
5. Inspection and or factory acceptance testing (FAT) dates.
6. Inspections completed / outstanding.
7. Inspection and test reports
8. Monthly contract quality progress report
9. Data books for the completed Works, before commissioning can commence (refer to the data book specification)

### 2.5.2 Quality Responsibility

1. The *Contractor* is responsible for the quality of the output and will take accountability for any poor service or product.
2. The *Contractor* is responsible for defining the level of QA/QC or inspections during the project.
3. The *Contractor* is responsible for defining the level of QA/QC or inspections to be imposed on his Subcontractors and suppliers of material. This level should be based on the criticality of the equipment and this should be submitted to the *Project Manager* for review and acceptance.
4. The intervention requirements take into consideration the criticality of the Plant and Material.
5. The interventions points include all witness, hold, verification and review points required by the *Employer*. The *Contractor's* failure to allow the intervention points will constitute a non-conformance.

### 2.5.3 Inspections

1. The *Contractor* is responsible for the inspection of all the Works that is performed and the *Project Manager* only verifies that the Works is conducted as per the contract.
2. The *Contractor* conducts all inspections in accordance with the accepted QCP / ITP.
3. The *Contractor* drafts a QCP or ITP which shows each activity from the Works Information and submits to the *Project Manager* for acceptance.
4. The *Contractor* provides suitably qualified personnel to conduct on-and-offsite inspections
5. The *Contractor* ensures that all Works are inspected and approved before the *Supervisor* is invited for verification.
6. The *Contractor* provides a minimum of 7 working days' notice for local inspections and 21 working days' notice for foreign inspections. The notice contains copies of the *Contractor's* inspection reports.
7. Damages as a result of the *Contractor's* failure to comply with the inspection notice periods as specified in the above paragraph (Paragraph 2.5.3 (f) will be borne by the *Contractor* and no compensation event will arise out of this.

### 2.5.4 Non Conformances and Defects

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

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

During the contract execution phase, the *Contractor* will be monitored by the *Employer* for performance on quality related aspects. The monitoring will be in the form of audits and assessments.

### 2.5.5 Quality Reporting

The *Contractor* submits a monthly quality report on the last working day on the month, including but not limited to the following:

1. A register of Defects which includes an explanation of the cause, the preventative and corrective action and the time period to remedy the Defects.
2. Updated QCP / ITP Register
3. QA monthly report summary
4. Monthly updated Site and pre-site programmes
5. Planned and completed local and or foreign inspection dates
6. Completed / outstanding inspections
7. Register of accepted Defects or Concessions
8. Project Quality progress report
9. The *Contractor* submits the following when requested by the *Project Manager*:

    a. Additional Inspection & Test plans (ITP's)
    b. Method statement for critical activities
    c. Organograms (changes only with the *Project Manager's* acceptance)
    d. Copy of all work instructions and procedures when requested by the *Project Manager*.

Apart from any statutory data packages required, the *Contractor* compiles a data package of the relevant drawings, test certificates etc for each section of work which must be submitted for review and sign off by the *Supervisor* at erection check stage prior to the commencement of the commissioning phase.

## 2.6 Programming constraints

### 2.6.1 General

The *Contractor* submits a single integrated Level 3 programme that incorporates all the work to be performed including that of his Subcontractors. The interfaces between Subcontractors as well as the interfaces between Subcontractors and the *Contractor* are clearly identified. Project key dates are incorporated into the programme.

### 2.6.2 Computerised Planning

Microsoft Projects is the planning tool that will be accepted for this project; therefore the *Contractor* is required to obtain this planning tool for the use of producing their programmes. The *Project Manager* does not intend duplicating the *Contractor's* planning and scheduling, however, the Accepted Programme will be used in the *Employer*'s internal integrated and Master project programmes for project control purposes, updating and monitoring. The accepted programme will be in Microsoft Projects file. The *Project Manager* requires one project programme to be used and updated during the installation process, which will remain with Eskom. This insures that any changes, deviations to the Programme can be carried out on the agreed programme and monitored. The initial programme supplied to Eskom after Contract award must be fully resource loaded.

Any changes that are required to be made to the Project/Programme i.e. scope changes, delays and the such, will be recorded through the Eskom change process and documentation, where all parties agree to the changes and sign.

The *Contractor* and *Project Manager* shall agree on the format of how the updates will be done i.e. PDF and the frequency of the updates i.e. such as on a weekly basis, or at any other time as required by the *Contractor*, or as instructed by the *Project Manager*.

### 2.6.3 Planning Programmes

The *Contractor* develops a contract programme which will include a bar chart conforming to the project master programme dates included and sufficient detail to indicate the *Contractor's* intention for executing the *works*. This programme covers major items relating to design, procurement, manufacture, delivery, installation, and commissioning. The critical path is clearly shown.

Key milestones, access dates, interface dates and commissioning key dates are clearly identified in the contract programme, including access dates and release of terminal points that involve the *Employer* or Others.

The programme makes provision for site related preparation such as site establishment, safety induction and medical clearance of the entire *Contractor's* staff that will be working on site.

#### 2.6.3.1 Design Programme

1. The design programme contains a full list of documents and drawings, their submission dates and duration for review as specified by the *Contractor*. The programme also illustrates the sequence of work for the project and the submission of drawings and any other documents.

2. The design programme shall meets the requirements of the *Contractor* and Others engaged on the project. The *Contractor* is required to submit the programme for review by the *Project Manager.*

3. The programme should include all the design reviews to be conducted. The *Employer* and *Contractor* is responsible for conducting the design reviews.

#### 2.6.3.2 Procurement and Manufacturing Programme

The *Contractor* is required to submit a procurement and manufacturing programme for review by the *Project Manager.* This programme shall be in sufficient detail to enable the work to be adequately tracked and progressed.

#### 2.6.3.3 Construction and Installation Programme

1. The *Contractor* shall submit a construction and installation programme that is resource loaded for review by the *Project Manager*.
2. This programme shall meets the requirements of the *Contractor* and Others engaged on the project.
3. The *Employer*'s practical training requirements shall be incorporated in the construction and installation programme. Refer to section 3.1.15.
4. The programme shall be based on the following working hours: Where applicable:
   a. Twenty four (24) hours per day
   b. Seven (7) days per week
   c. Holidays included as working days
   d. Pay weekends to be negotiated (if working 7 day work week)

#### 2.6.3.4 Commissioning Programme

1. Before commencement of the works, the *Contractor* develops a detailed commissioning programme with sufficient detail to enable the work to be adequately progressed and tracked to meet the commissioning key dates.
2. The *Employer*'s training programme shall be incorporated in the commissioning programme. Refer to section 3.1.15.
3. The commissioning programme shall be detailed to sub-system level and fully integrated with the Construction and Installation Programme.

#### 2.6.3.5 Reporting and Data Requirements for *Contractor*s Document number 240-83561037

This specification is included as an Annexure to the Works Information. This specification lists all the data and reporting that must be submitted by the *Contractor* on a weekly / monthly basis to the *Project Manager*. The purpose of this information is to implement proper project controls on this project.

## 2.7 *Contractor's* management, supervision and key people

1. The *Contractor* must supply an organogram and indicate the reporting flow from the highest position to the lowest position. The telephone numbers (office and cell phone) and e-mail addresses of all the key people on this project must be provided.

2. Below are the key persons referred to in clause 24 of the Contract. The *Contractor* includes the below listed key persons on the *Contractor's* organogram.

3. The *Contractor* provides the following key people as a minimum:

    - Dedicated Project Manager
    - Dedicated Project Planner
    - Dedicated Site Manager
    - Dedicated Quality Manager
    - Dedicated Site Safety Manager
    - Dedicated Site Safety Representatives
    - Factory Quality Control Supervisors
    - Dedicated Cost Engineer
    - Dedicated Project Controls Manager

4. In the *Contractor's* tender response, the *Contractor* shall state how many of the key people are required for the completion of the works. The *Contractor's* pricing for the provision of this activity must be stated in such a way that the *Employer* is able to assess the number of dedicated persons, their job function and the extent of their availability.

## 2.8 Invoicing and payment

Within one week of receiving a payment certificate from the *Project 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 *Project Manager's* payment certificate.

The *Contractor* shall address the tax invoice to Eskom Holdings SOC Ltd and include on each invoice the following information:

- Name and address of the *Contractor* and the *Project Manager;*
- The contract number and title;
- *Contractor's* VAT registration number;
- The *Employer*'s VAT registration number 4740101508;
- Work order number
- Invoice number
- Invoice date
- 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;
- The total Price for Work Done to Date which the *Contractor* has completed;
- Other amounts to be paid to the *Contractor* ;
- Less amounts to be paid by or retained from the *Contractor* ;
- The change in the amount due since the previous payment being the invoiced amount - excluding VAT, the VAT and including VAT.

All invoices in PDF format shall be emailed straight from your system to an Eskom email address (see email addresses below):

- Email addresses for invoice submission:
    - All invoices: invoiceseskomlocal@eskom.co.za
    - The *Project Manager* shall be copied when submitting invoices.
- All queries and follow up on invoice payments should be made by contacting the FSS Contact Centre:
    - Tel: 011 800 5060 or e-mail: fss@eskom.co.za
- For Foreign invoices, the *Contractor* is required to physically deliver hard copies of original documents to the *Project Manager* even though the *Contractor* has e-mailed those invoices.

- The *Contractor* ensures compliance with the tax requirement for submitting invoices electronically.
- If there is Cost Price Adjustment (CPA) on your invoice, the *Employer* recommends that the *Contractor* issue a separate invoice for CPA so that if there are any issues on the CPA the rest of the invoice can be paid while resolving CPA issues.
- The base invoice number needs to be mentioned on the CPA invoice.
- Electronic invoicing does not guarantee payment but ensures visibility of all invoices and ensures that no invoices get lost. If the Goods Receipt (GR) is not done the invoice will be parked and the system will automatically send an e-mail to the *Project Manager* to do the goods receipt. This is also tracked by the *Employer* through the parked invoice report.
- The *Contractor* can request a parked invoice report from the Finance Shared Services (FSS) Contact Centre which can then be followed up and corrected. You are welcome to forward the details of invoices corrected to the FSS Contact Centre.

At each assessment interval, the *Contractor* submits to the *Project Manager* a forecast rate of invoicing that includes all the expected payments by the *Employer* to the *Contractor* on a month-by-month basis.

## 2.9 Insurance provided by the *Employer*

There are no additional requirements to the risk and insurance clause in Section 8 of the core clauses.

## 2.10 Contract change management

For all compensation events, appropriate correspondence will be used as stipulated in terms and conditions of this contract. Refer to the NEC3 ECC Contract Core Clause 6, in the event any changes to the contract must be managed.

## 2.11 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.

## 2.12 Training workshops and technology transfer

The training requirements are outlined in section 3.1.15 of this document.

# 3 Engineering and the *Contractor's* design

The purpose of this Works Information is to state the *Employer*'s requirements and to provide the *Contractor* with the necessary information to submit a comprehensive tender to design, supply, install and commission RTM systems at selected Eskom substation and power station sites, and to provide training to the *Employer*.

## 3.1 *Employer*'s Design

This Works Information is for the provision of a system that will continuously and automatically monitor and display the geomagnetically induced currents (GIC) and the magnetic field (B-field) at selected sites on the Eskom network. RTM systems are not standard in the *Employer*'s operations. It is desirable that the RTM system must be mobile a temporary installation.

### 3.1.1 Specific Requirements

The *Employer* has the following specific requirements for the RTM systems, which the *Contractor* shall adhere to:

1. The RTM systems shall be capable of continuously and automatically measuring and monitoring the following parameters at selected sites on the Eskom network as shown in Table 2:
    a. The GIC in amperes (A)
    b. The following parameters of the magnetic field (B-field):
        - 3 axis (x, y, z components) magnetic field (B-field) magnitude in Tesla; against time
        - Resultant magnetic field magnitude in Tesla (T)
        - 3 axis (x, y, z components) rate of change of the magnetic field magnitude (dB/dt) in Tesla per time unit
        - Resultant rate of change of the magnetic field magnitude (dB/dt) in Tesla per time unit
        - 3 axis (x, y, z components) direction of the magnetic field in degrees
        - Resultant direction of the magnetic field in degrees
        - 3 axis (x, y, z components) rate of change of the direction (D) of the magnetic field (dD/dt) in degrees per time unit
        - Resultant the rate of change of the direction of the magnetic field
    c. The numbering sequence of the selected sites in Table 2 is not indicative of the order or sequence of the execution of the installation and commissioning works.

Table 2: *Employer*'s selected sites

| No. | Site Type | Site Name | Highest System Voltage |
|---|---|---|---|
| 1 | Power Station | Medupi | 400kV |
| 2 | Power Station | Matimba | 400kV |
| 3 | Power Station | Duvha | 400kV |
| 4 | Power Station | Drakensberg | 400kV |
| 5 | Power Station | Ingula | 400kV |
| 6 | Transmission Substation | Athene | 400kV |
| 7 | Transmission Substation | Invubu | 400kV |
| 8 | Transmission Substation | Grassridge | 400kV |
| 9 | Transmission Substation | Dedisa | 400kV |
| 10 | Transmission Substation | Hermes | 400kV |

| No. | Site Type | Site Name | Highest System Voltage |
|---|---|---|---|
| 11 | Transmission Substation | Mercury | 400kV |
| 12 | Transmission Substation | Maputo | 400kV |
| 13 | Transmission Substation | Hector | 400kV |
| 14 | Transmission Substation | Mersey | 400kV |
| 15 | Transmission Substation | Eros | 400kV |
| 16 | Transmission Substation | Neptune | 400kV |
| 17 | Transmission Substation | Witkop | 400kV |
| 18 | Transmission Substation | Merensky | 400kV |
| 19 | Transmission Substation | Spitskop | 400kV |
| 20 | Transmission Substation | Leseding | 400kV |

2. The RTM system must be mobile or temporary installation that has the ability to be disconnected after use at a specific site and recreate the set-up and connections at various sites, by transporting equipment in a van/light truck or in a trailer.
3. The *Contractor* shall determine the appropriate location at the selected sites for the installation of the RTM system to ensure effective measuring and monitoring.
4. Integration of the GIC and magnetic field data from RTM system into a web-based data acquisition system that can be accessed onsite and remotely by the *Employer*, with the following specific requirements:
    a. Hypertext transfer protocol secure (HTTPS) enabled web-based interface to navigate, view, download and interrogate the data using Microsoft Excel or comma-separated values (CSV) file formats without any encryptions.
    b. The web-based interface must have the capability to support common web browsers (Microsoft Edge, Mozilla Firefox, Google Chrome, Safari) on a personal computer or mobile device (cell phone, tablet etc.).
    c. The capability to locally (manually) download data from the RTM system via a universal serial bus (USB) port, using Microsoft Excel or CSV file formats without any encryptions.
    d. Minimum data storage period (data availability for download from the web-based data acquisition system both locally and remotely) of 2 years.
    e. Data display as data points, graphs or any user friendly method, allowing data interrogation on both the web-based interface and exported data files.
5. The RTM system communication medium shall be general packet radio service (GPRS) or any latest mobile communication technology.
6. The RTM system shall be enclosed to protect its functionality and operation against environmental elements. An ingress protection (IP) rating of 56 will be accepted, as a minimum.
7. The RTM system design shall be able to withstand seismic conditions at a minimum of 0.3g.
8. The expected life span of the RTM system shall be at least 15 years.
9. All components and accessories required for the successful operation of work under the scope of this project, either specified in detail or not, shall be supplied, installed and commissioned by the *Contractor* as necessary.
10. The RTM system shall be complete with all the equipment and material necessary for the safe, reliable operation and maintenance of the RTM system.
11. Any equipment and or function of the RTM system not specified herein shall be designed and supplied as required by the overall design of the RTM system.

12. The *Employer* and *Contractor* shall agree on the site prioritisation in terms of the execution of the installation and commissioning, and allocate site numbers accordingly.
13. The *Employer* reserves the right to:
    a. Reduce the number of selected sites, as it may be deemed necessary
    b. Reduce the number of RTM systems that will be installed, as it may be deemed necessary.
    c. To change any of the selected sites to different sites, as it may be deemed necessary.

### 3.1.2 Units Selection and Language

All units shall be SI-unit (metric). The *Contractor* shall be consistent in the units used throughout the contract.

All documents, drawings, data and manuals to be submitted, shall be written in the English language. The language for all communication shall be English.

### 3.1.3 Symbols

IEC symbols shall be used.

### 3.1.4 Matters on which the Works Information is Silent

In all matters on which the Works Information is silent, a ruling shall be sought from the *Employer*, and such a ruling shall then form part of the Works Information. The *Employer* has a preference for SANS followed by IEC standards. Where other international standards have been used, their differences, commonalities, and contradictions to the applicable SANS/IEC standard shall be indicated.

### 3.1.5 Meetings

As outlined in section 2.1 of this document.

### 3.1.6 Design Review

1. The *Contractor* shall present the RTM system Design to the *Employer* for technical review along with all relevant drawings.
2. A design review in a planned exercise is envisaged to ensure that there is a common understanding of the applicable standards and specification requirements, and to provide an opportunity to scrutinize the design to ensure the requirements meet the *Employer*'s requirements.
3. During this meeting, the comments of the *Employer* on the design will be reviewed and discussed in detail to finalize the design for the RTM system. Minutes of the meeting shall be prepared by the *Employer* / *Employer*'s Representative.
4. Procurement of any materials or manufacturing shall not precede the Design Review.
5. The *Contractor* scope of supply shall be subject to review, modification, comment, and/or approval by The *Employer*. The *Employer* will actively participate with The *Contractor* during the design review period, and many of these are expected to be concurrent and design approvals can be given at regular review meetings to be held wherever appropriate.

### 3.1.7 Installation and Commissioning Methodology

As part of the design review, the *Contractor* shall submit a detailed method statement on the installation and commissioning methodology, that shall be reviewed and approved by the *Employer* before the design is finalised.

### 3.1.8 Project Milestones

It is desirable that the RTM systems be installed, commissioned and fully operational at all the selected sites by 31 October 2024. The *Contractor* shall submit a project schedule demonstrating that the delivery date is met.

**The schedule as envisaged by the *Employer* is shown in**

Table 3. The numbering sequence of the selected sites in Table 2 is not indicative of the order or sequence of the execution of the installation and commissioning works. The *Employer* and *Contractor* shall agree on the site numbers, in terms of the order in which installation and commissioning will be executed.

**Table 3: *Employer*'s Envisaged Schedule**

| No. | Milestones | Start Date | Due Date |
|---|---|---|---|
| 1 | Site demonstration (*Contractor's* existing installation) | 01 February 2024 | 31 March 2024 |
| 2 | *Contractor* inspection of *Employer*'s selected sites | 01 February 2024 | 31 March 2024 |
| 3 | Design of RTM system | 01 February 2024 | 31 May 2024 |
| 4 | Installation and commissioning procedure | 01 May 2024 | 31 May 2024 |
| 5 | Acceptance testing (prototype) | 01 May 2024 | 31 May 2024 |
| 6 | Submission of practical training proposal | 01 May 2024 | 31 May 2024 |
| 7 | Supply, installation, commissioning, site acceptance testing & practical training: | 01 June 2024 | 31 October 2024 |
| 7.1 | Sites 1 – 4 | 01 June 2024 | 30 June 2024 |
| 7.2 | Sites 5 – 8 | 01 July 2024 | 31 July 2024 |
| 7.3 | Sites 9 – 12 | 01 August 2024 | 31 August 2024 |
| 7.4 | Sites 13 – 16 | 01 September 2024 | 30 September 2024 |
| 7.5 | Site 17 – 20 | 01 October 2024 | 31 October 2024 |
| 8 | Theoretical training | 01 November 2024 | 30 November 2024 |

### 3.1.9 Completion and Take Over

Completion of the Contract shall occur when all of the following activities, as a minimum, have been successfully completed and approved by The *Employer*:

1. The complete RTM system as specified has been designed, supplied, installed, tested, and commissioned as described in this specification, and deemed fully functional and acceptable.

2. The RTM system has successfully passed all The *Employer*'s Performance Verification and Acceptance Tests (SAT).
3. The *Contractor* has supplied all the site specific documentation and design drawings of the site specific RTM installations, to the *Employer*.
4. The special tools have been delivered to the site.
5. The reviewed copies of the complete documentation and drawings have been delivered to The *Employer*.
6. Theoretical and practical training of the personnel of The *Employer* has been completed, and all relevant documentation have been provided, as defined in this specification.

### 3.1.10 Working Hours

1. During the construction phase of the Project, the *Contractor* shall work within the normal working hours of The *Employer* unless otherwise instructed by The *Employer*.
2. For work requiring outages, the *Contractor* shall be prepared to work on weekends or nights, when outages are feasible.
3. The *Contractor* shall coordinate with The *Employer* to get work permits before commencing the job.

### 3.1.11 Shutdown/Outage Coordination

1. Planned outages of existing equipment, which are required for The *Contractor's* Work, shall be minimized by The *Contractor* during the Project execution.
2. As a part of The *Contractor's* coordination activity (for the planned outage), The *Contractor* shall provide reasons, plans, and a detailed schedule for the planned outages that will be subject to The *Employer*'s review and approval.
3. The *Employer*'s approval of planned outages shall be based solely on The *Employer*'s operational considerations.
4. The *Contractor* shall note that, as a minimum requirement, The *Employer* will consider approval of the *Contractor's* proposed planned outages during low load periods, and when the *Contractor* shall provide enough manpower at the outage site(s) to minimize the planned outage time.
5. No unplanned outages/disruption of the *Employer*'s equipment, regular operations, or systems shall be allowed to support the *Contractor's* installation of any new equipment, or the *Contractor's* movement/relocation of existing equipment at any site.
6. All outages shall be scheduled at least four (4) weeks in advance. Any requested outage must be approved by The *Employer* at least two (2) working weeks before actual Work is carried out.
7. During the outage, only work related to the installation, testing and commissioning of the RTM system shall be carried out.

### 3.1.12 Loss Prevention

#### 3.1.12.1 General Requirements

1. The *Contractor* and/or *Contractor's* Sub-*Contractor*(s) shall strictly comply with the following Loss Prevention requirements, in addition to the stipulations in the General Terms and Conditions of the Contract.
2. Adherence to all applicable provisions of The *Employer*'s Accident Prevention Manual and Construction Safety Manual is of utmost importance.
3. The *Contractor's* safety *Supervisor* shall conduct a safety presentation of the program to The *Employer* by using a laptop and projector prior to submission of the program. The purpose of the presentation is to ensure understanding and to determine the practicality of the program prior to the approval of The *Employer*.

4. Compliance with the provisions of The *Employer*'s general instructions on ORHVS, work permit and Clearance Procedure is required. The *Contractor* shall work under the supervision of an authorised person provided by the *Employer*.
5. The *Contractor* shall employ qualified safety *Supervisor* / safety engineer(s) to coordinate, administer, and ensure full implementation of the program. The nominated safety *Supervisor*/safety engineer shall be pre-qualified by The *Employer* upon the execution of the contract.
6. The *Contractor* shall provide all necessary personal protective clothing (i.e. head, eye, face, hand, and foot protection) and respiratory protective equipment including personal protective equipment for fall protection such as safety harnesses and lifelines, and implement wearing them.
7. The *Contractor* shall provide and use adequate and suitable safety/warning signs, cordon tapes, portable barricades, warning lights, and personal protective equipment at the substation to protect the safety of The *Employer*, *Contractor* personnel, and the public, and to prevent damage to property.
8. The *Contractor* shall provide traffic warning or control warning devices when working near or along roadways, for the safety of personnel and the public. When required by The *Employer*, The *Contractor* shall provide personnel (as flagman) to direct and maintain traffic in affected roadways.
9. The *Contractor* shall provide first-aid facilities and must have a certified employee to administer first aid and Cardio-Pulmonary Resuscitation (CPR). A valid copy of the first aider certificate shall be attached with the Loss Prevention Program.
10. The *Contractor* shall refrain from using mechanized excavation equipment within restricted areas unless cleared and permitted to do so.
11. The *Contractor* shall request clearance, in advance, for de-energizing the interfacing points and observing grounding procedures.
12. The *Contractor* shall obtain identity (ID) cards for his employees and/or stickers for his vehicles/equipment prior to mobilization to site from The *Employer*.
13. In order to prevent theft/loss of materials/equipment, The *Contractor* shall take the necessary measures and precautions including but not limited to the following:

    a. All materials provided or used shall be stored by The *Contractor* in safe and secured locations even if stored for short periods of time.
    b. If the equipment/materials are to be stored in the substation or power station area for a prolonged period, The *Contractor* shall ensure that they are kept in locked containers or any other appropriate method of storage such that the materials/equipment are not easily noticeable by people with intention of theft or pilferage. Moreover, such containers shall be placed at a safe distance from the fence/boundary wall.
    c. The *Contractor* shall also consider other factors (i.e. temperature, humidity, etc.) affecting the storage of materials/equipment being stored in containers, to avoid any damage during such storage period.

### 3.1.12.2Loss Prevention Program

The *Contractor* shall submit his Loss Prevention Program to The *Employer* sufficiently in advance to obtain The *Employer*'s approval prior to commencement of Work at site. The Loss Prevention Programs shall contain the following:

1. Cover Page complete with references, as follows:
    - *Contractor's* name
    - Title of submission
    - Project title and location
    - Contract number
    - The *Employer*'s name
    - Date and revision
2. Table of Contents
3. *Contractor's* Company Safety Policy Statement complete with signature over printed name and title of *Contractor's* management representative.
4. Specific program items (suitable for the scope of work) that The *Contractor* proposes to implement during Contract execution.

5. Attachments necessary to supplement the program:
    - Project table of organization
    - Construction schedule
    - Equipment schedule
    - Manpower schedule
    - *Contractor's* standard forms for safety related reports
    - Copy of valid certificate of first aid
    - Temporary facilities layout and location plan with electrical layout depicting the source of power, grounding layout, fire protection equipment layout, etc.
    - Curriculum Vitae of safety Engineer.

#### 3.1.12.3 Project Near Energised Lines or Equipment

1. Observe working clearances when working near or about energized lines or equipment as per The *Employer*'s Accident Prevention Manuals and ORHVS.
2. Where it is not possible to observe working clearances or the potential for transgression exists, the relevant safety practices shall be employed as per The *Employer*'s Accident Prevention Manuals, ORHVS or other relevant regulations.
3. The *Contractor* shall require coordination with The *Employer* to work under permission or NO TEST ORDER (NATO) provided the line or equipment will remain hot / energised.

### 3.1.13 Equipment Specifications

The *Contractor* shall provide the technical specifications of the modules of the RTM system, for the purpose of sourcing spares and any maintenance and operational requirements.

### 3.1.14 Acceptance Testing & Inspection

The acceptance testing and inspection of the complete RTM system shall be done in the presence of the *Employer*, at the *Contractor's* facilities and on site, at the selected sites.

Acceptance testing and inspection shall be done as follows:

1. On the prototype of the RTM system, after the design has been approved by the *Employer* (FAT).
2. On site with each installation of the RTM system at the selected sites, after commissioning (SAT)

### 3.1.15 Training

1. The *Contractor* shall provide practical and theoretical (classroom) training to the *Employer* with regards, but not limited to the installation, commissioning, operation, maintenance and engineering of the complete RTM system.

2. Practical training will be on the job during the installation and commissioning of the RTM system at least 3 of the selected sites.

3. Theoretical training shall be completed after the RTM systems have been commissioned at all the selected sites. Theoretical training will take place at the *Employer*'s premises (Eskom Research, Testing & Development, Lower Germiston Road, Rosherville).

4. Practical and theoretical training must be provided to at least 10 participants.

5. The *Contractor* shall submit a training proposal for practical and theoretical training to the *Employer* incorporating the *Employer*'s requirements, and indicating the practical and theoretical training duration, training modules to be covered, and any additional requirements from *Contractor*. The training proposal along with the training material shall be provided to the *Employer* for review and acceptance before the training. All training material shall be in the English language. As a minimum, the training modules shall cover the following aspects, as practical and theoretical training:

    a. Installation

b. Commissioning
c. Equipment operation and trouble shooting
d. Maintenance (including replacement of parts)
e. Software operation and troubleshooting
f. Data verification, interpretation, handling, download, and management via the web-based data acquisition system and USB port.
g. Communications infrastructure

6. The *Contractor* shall issue certificates of attendance to all participants attending the practical and theoretical training.

### 3.1.16 Warranty

The *Contractor* shall provide the *Employer* with a warranty period of at least 2 years, after the defects period upon sectional completion of the works has ended, and on the following basis:

- Telephonic support within 24 hours after a reported fault/failure.
- Based on the outcome of the telephonic support, if call out support is required the *Contractor* needs to give on-site support within 48 hours from the reported fault.

### 3.1.17 Support

Technical support will be on an as-and-when required basis.

### 3.1.18 Calibration, Maintenance & Spares

1. The *Employer* desires a self-calibrating and maintenance free system. However, the *Contractor* shall inform the supplier of the calibration, maintenance and spares requirements.
2. The *Contractor* shall provide a document indicating the frequency of scheduled calibration and maintenance on the RTM systems and provide annual cost projections thereof. In addition the *Contractor* indicates the availability and lead times of all spares locally or foreign.
3. Software upgrades that are required, but not implemented shall not affect the functionality of the RTM system. All software upgrades that are required shall be web-based and at no cost to the *Employer*.

### 3.1.19 Software Licensing

If and where applicable, the *Contractor* shall provide the *Employer* with the licensing requirements associated with the software of the RTM system. The *Employer* prefers that the licensing of the RTM system be valid for a period of at least 15 years.

### 3.1.20 Documentation, Drawings & Manuals

The *Contractor* shall provide the following documentation to the *Employer* upon commissioning and handover (as hard copies x 2 and electronic copies on a USB storage device):

- Design outline drawings
- Calibration certificates
- Calibration requirements manual
- Maintenance requirements manual
- Spares requirements
- Operating and troubleshooting manuals for equipment, software, web-based data acquisition system and communications infrastructure
- Analysis and interpretation manuals
- Equipment and software warranties
- Software licensing documentation (if applicable)
- Training documentation and manuals

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

The *Contractor* shall provide, but shall not necessarily be limited to, the following scope of works:

1. Facilitate a site demonstration of any one of the *Contractor's* existing operational RTM systems or similar operational installations (if available). This will give the *Employer* the opportunity to assess and understand the *Contractor's* capabilities.
2. Conduct physical inspections of the *Employer*'s selected sites, provided in Table 1. This will inform the *Contractor* of the site specific requirements for the design of the RTM system.
3. Determine the appropriate location at the selected sites for the installation of the RTM system to ensure effective measuring and monitoring.
4. Design an RTM system with the following requirements:
    a. A mobile or temporary installation.
    b. The capability to continuously and automatically measure and monitor the following parameters:
        - The GIC in A.
        - The following parameters of the magnetic field (B-field):
            - 3 axis (x, y, z components) magnetic field (B-field) magnitude in Tesla; against time
            - Resultant magnetic field magnitude in Tesla (T)
            - 3 axis (x, y, z components) rate of change of the magnetic field magnitude (dB/dt) in Tesla per time unit
            - Resultant rate of change of the magnetic field magnitude (dB/dt) in Tesla per time unit
            - 3 axis (x, y, z components) direction of the magnetic field in degrees
            - Resultant direction of the magnetic field in degrees
            - 3 axis (x, y, z components) rate of change of the direction (D) of the magnetic field (dD/dt) in degrees per time unit
            - Resultant the rate of change of the direction of the magnetic field
    c. Integrate the GIC and magnetic field data into a web-based data acquisition system that can be accessed on-site and remotely, with the following specific requirements:
        - Hypertext transfer protocol secure (HTTPS) enabled web-based interface to navigate, view, download and interrogate the data using using Microsoft Excel or comma-separated values (CSV) file formats without any encryptions.
        - The web-based interface must have the capability to support common web browsers (Microsoft Edge, Mozilla Firefox, Google Chrome, Safari) on a personal computer or mobile device (smart phone, tablet etc).
        - The capability to manually download data from the RTM system via a universal serial bus (USB) port, using Microsoft Excel or CSV file formats without any encryptions.
        - Minimum data storage period (data availability for download) of 2 years.
        - Data display as data points, graphs or any user-friendly method, allowing data interrogation on both the web based interface and exported data file.
    d. The RTM system communication medium shall be GPRS or any latest mobile communication technology.
    e. The RTM system design shall be able to withstand seismic conditions at a minimum of 0.3g.
    f. The expected life span of the RTM system shall be at least 15 years.
    g. The RTM system shall be enclosed to protect its functionality and operation against environmental elements. An ingress protection (IP) rating of 56 will be accepted, as a minimum.

h. Design review requirements and approval of the final design as outlined in section 3.1.6.

5. Submit an installation and commissioning procedure for the RTM systems at the selected sites. Refer to section 3.1.7.
6. Facilitate acceptance testing of the RTM system prototype at the *Contractor's* premises. Refer to section 3.1.14.
7. Submit a training proposal for practical training to be provided to the *Employer*.
8. Supply up to twenty (20) RTM systems complete with all accessories and material required, as per the approved design. The *Employer* reserves the right to reduce the number of RTM systems required, as it may be deemed necessary.
9. Install and commission up to twenty (20) RTM systems at the *Employer*'s selected sites. The *Employer* reserves the right to reduce the number of selected sites, as it may be deemed necessary. The *Employer* reserves the right to any of the change the selected sites as deemed necessary.
10. Facilitate site performance and acceptance testing (site acceptance testing - SAT) for each of the selected sites, after it has been commissioned.
11. Provide practical training to the *Employer*, as part of the installation and commissioning works at the selected sites.
12. Provide theoretical training to the *Employer*, once commissioning and acceptance testing (SAT) at all the selected sites have been completed.
13. Provide technical support to the *Employer* on an as-and-when required basis.
14. The *Contractor* may be required to participate in knowledge transfer workshops on request from the *Employer*, on an as-and-when required basis.
15. The following general requirements shall apply:
    a. All components and accessories required for the completion and successful operation of the Work covered under the scope of this project, either specified in detail or not, shall be supplied by the *Contractor* as necessary.
    b. The RTM system shall be complete with all the equipment and material necessary for the safe, reliable operation and maintenance of the RTM system.
    c. Any equipment and or function of the RTM system not specified herein shall be designed and supplied as required by the overall design of the RTM system.
    d. The *Contractor* shall provide transportation of all equipment and accessories required as part of the work to the relevant sites.
    e. The *Contractor* shall provide suitable storage of all equipment to be used in the scope of work.
    f. Maintenance and emergency assistance during the guarantee period including technical support thereafter.
    g. Provide the all the required documentation pertaining to the RTM system as outlined in section 3.1.20.
16. The *Employer* reserves the right to:
    a. Reduce the number of selected sites, as it may be deemed necessary
    b. Reduce the number of RTM systems that will be installed, as it may be deemed necessary.
    c. To change any of the selected sites to different sites, as it may be deemed necessary

## 3.3 Procedure for submission and acceptance of *Contractor's* design

1. The *Contractor* shall submit the RTM system design to the *Project Manager*.
2. A design review will then be scheduled by the *Employer* as outlined in section 3.1.6.
3. A decision on the *Employer*'s acceptance of the design will be issued:

a. After the acceptance testing (FAT) of the prototype has been completed; and

b. After the *Contractor's* installation and commissioning procedure has been accepted by the *Employer*.

4. The *Contractor* will be notified in writing on the acceptance of the design.
5. On acceptance of the design the *Contractor* shall submit the following documents:

a. Final design of the RTM system

b. Installation and commissioning procedure

## 3.4 Other requirements of the *Contractor's* design

None.

## 3.5 Use of *Contractor's* design

The *Employer* may use and copy the *Contractor's* design for any purpose connected with construction, use, alteration or demolition of the works unless otherwise stated in the Works Information and for other purposes as stated in the Works Information.

## 3.6 Design of Equipment

The *Contractor* submits particulars of the design of an item of Equipment to the *Project Manager* for acceptance if the *Project Manager* instructs him to. A reason for not accepting is that the design of the item will not allow the *Contractor* to Provide the Works in accordance with

- the Works Information,
- the *Contractor's* design which the *Project Manager* has accepted or
- the applicable law.

## 3.7 Equipment required to be included in the *works*

All equipment required to execute the works will be the responsibility of the *Contractor*.

## 3.8 As-built drawings, operating manuals and maintenance schedules

The *Contractor* need to supply the *Employer* with all the relevant modification drawings, operating and maintenance manuals required to operate and maintain the RTM system. The *Contractor* also needs to provide the *Employer* with a maintenance schedule. This documentation is required in hard and soft copy after commissioning. A minimum of 3 hard copies per document is required.

# 4 Procurement

There is a cross reference from the definition of Disallowed Cost in Options C D and E to the Works Information regarding procurement procedures. This part of the Works Information MUST include any such procedures to be able to administer this procedure. Options A & B may also require constraints on procurement procedures.

## 4.1 People

### 4.1.1 Minimum requirements of people employed on the Site

Specify any constraints relating to people employed to Provide the Works; for example permits for foreigners, training (other than H & S), use of labour from designated areas and industrial relations.

### 4.1.2 BBBEE and preferencing scheme

Specify constraints which *Contractor* must comply with after contract award in regard to any Broad Based Black Economic Empowerment (B-BBEE) or preferencing scheme measures.

### 4.1.3 Accelerated Shared Growth Initiative – South Africa (ASGI-SA)

If the ASGI-SA requirements are to be included in this contract specify constraints which *Contractor* must comply with after contract award in regard to any ASGI-SA requirements. The ASGI-SA Compliance Schedule completed in the returnable tender schedules is reproduced here. If ASGI-SA does not apply, delete this paragraph.

The *Contractor* complies with and fulfils the *Contractor's* obligations in respect of the Accelerated and Shared Growth Initiative - South Africa in accordance with and as provided for in the *Contractor's* ASGI-SA Compliance Schedule stated below

.

*[Insert the agreed ASGI-SA Compliance Schedule here]*

The *Contractor* shall keep accurate records and provide the *Project Manager* with reports on the *Contractor's* actual delivery against the above stated ASGI-SA criteria. [Elaborate on access to and format of records and frequency of submission etc.]

The *Contractor's* failure to comply with his ASGI-SA obligations constitutes substantial failure on the part of the *Contractor* to comply with his obligations under this contract.

## 4.2 Subcontracting

### 4.2.1 Preferred Subcontractors

The *Contractor* makes use of any supplier for sourcing of equipment, tools and material which the *Contractor* will use to execute works.
2nd and 3rd Tier Companies (Subcontractors) should be submitted to Eskom for vetting and approval (That is, to be evaluated for LBS/BWO/SBE/BYO BPLwD classification in terms of the requirements of 32-1034.

### 4.2.2 Subcontract documentation, and assessment of subcontract tenders

1. The *Contractor* submits the proposed contract data for each subcontracting for acceptance to the *Project Manager*.
2. The *Contractor* prepares a subcontracting document as according to the NEC Contract.
3. The *Contractor* must inform the *Project Manager* when intending to subcontract some of the works from the contract scope.
4. The *Contractor* takes note that their Subcontractors Safety Files will be accepted by the *Contractor's* Safety Manager before it is handed to the *Employer*'s SHE practitioner/Officers for verification of compliance before any work commences. Proof of acceptance by the *Contractor* Safety Manager needs to be in the Safety file when handed over to *Employer*'s SHE Practitioners for verification.
5. The *Contractor* only employs qualified Subcontractors.

### 4.2.3 Limitations on subcontracting

Not applicable for this contract.

### 4.2.4 Attendance on Subcontractors

As agreed between the *Contractor* and the *Project Manager*.

## 4.3 Plant and Materials

### 4.3.1 Quality

1. All the RTM systems installed and commissioned at the selected sites will be free from defects. No Reconditioned Plant and/or Materials are regarded as new under any circumstances.
2. The *Contractor* will not use Plant or Materials which are generally recognized as being unsuitable or otherwise to be avoided for the purpose for which they are intended.
3. Only components of high reliability will be utilized, with a proven operating history, to enable the RTM system to achieve the required reliability and availability. Plant and Material design, engineering and manufacture will accord with the best modern practice applicable to high-grade products of the type to be furnished, so as to ensure the efficiency and reliability of the works and the strength and suitability of the various parts for the works.
4. Plant and Materials withstands ambient conditions and the variations of temperature arising under working conditions without distortion, deterioration or undue strains in any part.
5. All parts are made accurately, and where practicable, to standard gauges so as to facilitate replacement and repairs. Like parts are interchangeable.
6. No repair of defective Plant and/or Materials will be permitted without the *Project Manager's* approval and any such repair, if approved, will be carried out to the satisfaction of the *Employer*.
7. The *Contractor* ensures that co-ordinated and formally documented management system is in place for the assurance of quality as specified in ISO 9001, Quality management Systems – Requirements.
8. The *Project Manager* is free to specify hold and witness points during the installation and on site testing stages of the project. The *Contractor* issues preliminary notification of such hold and witness points by fifteen (15) working days advance notice to the *Project Manager*, and confirms such hold and witness points at least seven days prior to the activity.
9. Typical holding points are listed below:
    a. Design review
    b. Installation and commissioning methodology
    c. Acceptance testing (prototype)
    d. Installation and commissioning at the selected sites
    e. Site acceptance testing at the selected sites

f. All documentation (manuals, drawing etc.) in the specified format

10. All documentation related to the RTM system design, supply, installation, commissioning, acceptance testing, inspection and training records are safely stored for a minimum period of seven years following the final completion of the works.
11. After this period, the *Contractor* offers these records to the *Employer* (in writing) and obtains a disposal instruction.
12. Documentation regarding quality procedures is submitted within thirty days of Contract Award. The *Employer* will review and comment on the acceptability of these documents in a time frame as per the requirements of the contract for contractual correspondence. If controlled copies of these documents have been submitted to the *Employer*, then the controlled copy numbers may be quoted in the submission.

### 4.3.2 Plant & Materials provided "free issue" by the *Employer*

All Plant and Materials required to complete the works shall be provided by the *Contractor*.

### 4.3.3 *Contractor's* procurement of Plant and Materials

1. The *Contractor* shall supply and use suitable and sufficient construction plant, tools and equipment and materials as may be required to carry out the works efficiently.
2. The *Contractor* at all times provides protection for all plant and materials from damage or loss due to weather, fire, theft, unexplained disappearance or similar.
3. The *Contractor* at all times protects from damage, due to the *Contractor*s service to provide the works, all plant and materials and equipment and all items on the site that are the property of the *Employer* or Others.
4. The *Contractor* provides or manages, as part of Works everything necessary for the receiving, inspection, safe keeping and storage, issuing, handling, management and administration of all plant and materials purchased by the *Contractor*.
5. The *Contractor* will ensure to provide all guarantees and warranties of the plant & materials used in the Works to the *Project Manager* and *Employer* when construction is completed.
6. The *Contractor* supplies the labelling for the Plant that forms part of the works. The *Contractor* make used of codes and descriptions provided by the *Employer*.
7. The labels are affixed in such a way that they are easily legible and not obstructed by the wiring or by other components.
8. Clamping methods applied to the labels ensures that removal of the labels requires force. The *Project Manager* will approve the proposed method of clamping prior to use.
9. The *Contractor* supplies the *Project Manager*, for verification and acceptance purposes, with a label list showing the text only. The *Project Manager* will approve the positioning and designation of labels.
10. The *Contractor* arranges all shipments of Plant and Materials and consigns all such shipments to him as consignee at the project shipping address, freight fully prepaid. The *Contractor* makes demurrage agreements and settlements with carriers for his shipments.

### 4.3.4 Spares and consumables

Each recommended spare is uniquely identified with a part number, which can be cross referenced to a spares list and associated drawing.
The *Employer* prefers that support from the OEM is available locally in South Africa. The *Contractor* is required to keep high cost items in stock for 30 days delivery on demand, and to provide technical and product support for the design life of the RTM system as and when required.

## 4.4 Tests and inspections before delivery

The *Employer* carries out quality inspections at his discretion. All inspections and testing to be performed in accordance with the Quality Control Plan (QCP) developed by the *Contractor*.

## 4.5 Marking Plant and Materials outside the Working Areas

Not applicable.

## 4.6 *Contractor's* Equipment (including temporary works).

The *Contractor* supplies, installs, maintains and removes all temporary construction facilities and utilities necessary to provide the *works.*

## 4.7 Cataloguing requirements by the *Contractor*

Not applicable.

# 5 Construction

## 5.1 Temporary works, Site services & construction constraints

### 5.1.1 *Employer*'s Site entry and security control, permits, and Site regulations

1. Access to the site is controlled and it is governed by the terms and conditions lay down by the security officials of the *Employer*'s selected sites in Table 1 where the RTM systems will be installed. The *Contractor* shall conduct physical inspections of the *Employer*'s selected sites after the kick off meeting and before the design of the RTM system is to commence.
2. The *Project Manager* shall inform the *Contractor* of the all access requirements to the selected sites, and arrange the *Contractor's* access to the selected sites. The *Contractor* shall liase with the *Project Manager* for access to all the selected sites.
3. The *Contractor* ensures that all its employees carry their site access forms with them all the time.
4. The *Contractor* is subjected to alcohol testing on a daily basis.
5. The *Contractor* submits his application for vehicle permit to the *Project Manager*. The personnel and vehicles entering and leaving the site are subjected to routine searches.
6. The *Contractor* obtains a "Gate Removal Permit" from the *Project Manager* before materials and equipment can be removed from site. The "Gate Removal permit" gives itemised list of materials and equipment to be removed from site.
7. The *Contractor* ensures that a tool list is available on the day of arrival and that all tools are captured on the tool list. The tool list will be handed over to the Reception Security official that will stamp the tool list. The tool list will be kept safe and will be used when tools needs to be remove from site.

### 5.1.2 Restrictions to access on Site, roads, walkways and barricades

#### 5.1.2.1 Barricading

Access to danger zones is restricted using handrail type guards of at least 1, 2 metres high and able to block access to the danger zone. Symbolic safety signs depicting "Danger" and "No entry" are attached to the guards. This includes access during the taking of X-rays.

#### 5.1.2.2 Roads

The *Employer* makes every effort to maintain the roads on the Site in a fair condition and all construction traffic is limited to using these roads.

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

1. The *Contractor* is to be available during Eskom normal working hours, which are as follow:
   - Mondays to Thursdays: 08:00 – 16:30
   - Fridays: 08:00 – 12:00 (Eskom Power Stations); 08:00 – 16:00 (Eskom Transmission Substations)
2. *Contractor* should make prior arrangements about a week before the time, if any of the *Employer*'s employees is required for the weekend.
3. The *Contractor* must have proper means for communication, i.e. cell phone or email to enable the *Employer* to communicate with *Supervisor*s or workers without delay.
4. The *Contractor* provides all necessary materials and uses his own equipment, tools, labour, transport, etc.
5. The *Contractor* makes good, physically or financially (for his account), in all trades to existing work, as necessary where disturbed or damaged.
6. Site speedometer is 40 km/h and in busy areas 20km/h.
7. Before work starts on Site, an inaugural meeting is held with the *Contractor* and the *Project Manager* explaining in detail all requirements of the Site Regulations.
8. The *Contractor* must attend a compulsory Safety induction Course with all his Employees before any work on site. The Contract must also organise for all his employees to attend the induction course.

9. The onus is on the *Contractor* to ensure that he/she familiarise him/herself with the *Employer*'s Site regulations and inspections.
10. It is very important that the *Contractor* keeps records of his people on Site, including those of his Subcontractors which the *Project Manager* or *Supervisor* have access to at any time. These records may be needed when assessing compensation events.

### 5.1.4 Health and safety facilities on Site

1. The *Contractor* takes full responsibility for any disease and/or epidemic outbreak on site and will ensure that control measures are in place to prevent any such disease and/or epidemic.
2. The *Contractor* will ensure that regular health and wellness session are presented to his employees to prevent any outbreak of any disease and/or epidemic.
3. The *Contractor* will have a first aid facility on site during the day and especially during night times to ensure that his employees receive proper treatment during a first aid incident.
4. The *Contractor* will ensure that his employees as well as his Subcontractor are taken to the nearest medical centre during a serious injury which cannot be treated out of a first aid box. The *Contractor* will ensure that the *Project Manager* is immediately informed about the incident.

### 5.1.5 Environmental controls, fauna & flora, dealing with objects of historical interest

As per the site specific waste management procedures of the *Employer*'s selected sites, the National Environmental Management Act (NEMA, Act No. 107 of 1998) and the National Environmental Management Waste Act (NEMWA, Act No. 59 of 2008).

### 5.1.6 Title to materials from demolition and excavation

As per Clause 73.2 the *Contractor* has no title to materials from excavation and demolition (e. g. copper).

### 5.1.7 Cooperating with and obtaining acceptance of Others

1. If Others are conducting work on the Site simultaneously with the *Contractor*, the *Contractor* shall co-ordinate his work with the *Project Manager* to maintain harmonious working conditions on Site.
2. During the progress of the works the *Contractor* provides access to Others who also execute work in the same area, on an as-and-when required basis. The *Contractor* shall notify the *Project Manager* of such instances.
3. The *Contractor* makes his own assessment of the difficulties which may be encountered by providing access to and interfacing with Others (this includes access difficulties experienced during installation or commissioning phase).

### 5.1.8 Publicity and progress photographs

1. The taking of photographs at the *Employer*'s selected sites including the works associated with the project is restricted and subject to the approval by the *Project Manager*.
2. For the purpose of the progress reporting requirements, the *Project Manager* may prohibit the taking of such photographs and/or require that all such photographs be taken by an official *Employer*'s photographer. In the latter event, the *Contractor* is required to make arrangements directly with the official *Employer*'s photographer in regard to the taking of the required photographs for purpose of the progress reporting requirements

### 5.1.9 *Contractor's* Equipment

1. The *Contractor* provides all Equipment that is required to complete the works.
2. The *Contractor* shall ensure that all his construction labour and equipment remains within the fenced off allocated construction area.
3. The *Contractor* shall ensure that any staff, labour, or equipment moving outside his allocated construction site does not obstruct the normal operation of the *Employer*'s selected sites. Any additional access routes required must be coordinated with the *Project Manager*.

4. The *Contractor* must keep daily records of his equipment used on Site and the Working Areas (distinguishing between owned and hired Equipment) with access to such daily records available for inspection by the *Project Manager* at all reasonable times.
5. All Equipment used by the *Contractor* in providing the Works shall comply with the General Machinery Regulation 4 of the Occupational Health and Safety Act (Act 85 of 1993).
6. Scaffolding:
    a. Erection of scaffolding and working platforms is the responsibility of the *Contractor.*
    b. Any temporary platforms or scaffolds which are required are designed to accommodate the mass of all material and equipment as well as personnel and due regard is taken to ensure the free flow of the above to and from other working areas.
    c. No scaffolds or platforms are used without having been safety cleared and the documentation completed with the Scaffold *Contractor.*

### 5.1.10 Equipment provided by the *Employer*

1. No Equipment will be supplied by the *Employer*; however the *Employer* does reserve the right to negotiate with the *Contractor* that different equipment be used of another origin for whatever purpose that may become apparent at the time.
2. The *Contractor* supplies all equipment, scaffolding and other earthmoving equipment for the construction of the works and site establishment.

### 5.1.11 Site services and facilities

#### 5.1.11.1 *Contractor's* work area

1. Based on the appropriate location for installation of the RTM system as determined by the *Contractor*, the area will be made available to the *Contractor* to execute the required works.
2. The *Contractor's* work area is subject to periodic inspection by the *Project Manager*/delegated person.

#### 5.1.11.2 Roads

1. Main access roads are surfaced and complete and may be used by the *Contractor* with the necessary care. The *Employer* maintains the Site roads, described above, to a fair condition. Any costs incurred by the *Project Manager* from damage caused to underground services, structures, etc. as a result of the *Contractor* not using the prescribed routes is recovered from the *Contractor*.
2. The *Contractor* provides temporary access points from the prescribed routes and roads to the points where the *Contractor* is required to perform work, having first obtained permission in writing from the *Project Manager*.

#### 5.1.11.3 Electricity

1. Electricity will be made available for installation and commissioning purposes free of charge from power points which will be indicated by the *Project Manager*. The *Contractor* is responsible for the provision of the reticulation system from the point of supply. Both 220 (AC) Volt and 380 (AC) Volt are available on request. All points of supply requested by the *Contractor* are provided in terms of quantity and location at the discretion of the *Project Manager*.
2. No guarantees of power supply quality are given and power supply breaks of some duration may occur without warning. Planned outages are also a possibility. The *Contractor* makes arrangements at his own expense to improve continuity and quality of power where necessary for any reason and no claim of any nature relating to power failures is considered.
3. No connection is made to the permanent installation at the *Employer*'s selected sites without the prior acceptance of the *Project Manager*.
4. The power supply is managed in accordance with the latest revision of the Eskom safety regulations i.e.:
    a. 32-846, Operating Regulations for High-Voltage Systems
    b. 36-681, Generation Plant Safety Regulations
    c. COC for the site installation is required prior to power being switched on.

#### 5.1.11.4 Conditions of supply

1. No guarantees of power supply quality are given and power supply breaks of some duration may occur without warning. In order to comply with the Electrical Installation regulation under Occupational Health and Safety Act the following must be met.
    - Before electricity is supplied, the *Contractor* must be in possession of a valid certificate of compliance.
    - The *Contractor's* electrical work must be inspected and tested by an accredited person to ensure that it complies with the requirements of the Act and the code of practice for wiring premises, Part 1: Low voltage installations, SABS 0142-1.
    - After certificate of compliance is obtained, the *Employer* inspects the electrical installation and if satisfied, is connected and supplied from the construction power supply. Warning: the rotation may change during a power break.
    - The *Contractor* checks rotation of the equipment before commencing work.
2. The *Contractor* must supply a written request of all the *Contractor's* requirements about 15 days before the start of the Outage.

#### 5.1.11.5 Temporary cabling

The *Contractor* provides at his own expense, all temporary cabling, wiring and adapters as required to lead power from the *Employer* points of supply to the various points where it is required. He maintains and removes these on completion.

#### 5.1.11.6 Electricity equipment/appliances

Any electrical equipment, or appliances, used by the *Contractor* conforms to the applicable South African safety standards and is maintained in safe and proper working conditions. The *Project Manager* has the right to stop the *Contractor's* use of any electrical equipment, or appliance, which, in the opinion of the *Project Manager's* representative, does not conform to the foregoing.

#### 5.1.11.7 Water

1. Water will be made available on request free of charge from water points on site. The *Contractor* supplies at his own cost all the necessary connections, fittings, piping work, temporary plumbing and pumps necessary to lead water from the *Employer's* points of supply to the various points where it is required. The *Contractor* is responsible for maintaining this equipment and for removing it at Completion of the whole of the works.
2. The *Project Manager* does not guarantee continuity of supply and the *Contractor* makes his own provision for standby supplies to maintain continuity of work. Claims of any nature relating to discontinuity of water supply are not considered.

#### 5.1.11.8 Sanitary facilities

1. Where required, the *Contractor* shall provide and maintain adequate and suitable sanitized ablution facilities appropriate to the workforce size and work duration that conforms to the requirements of all applicable legislation. Separate ablution facilities shall be provided for both genders. The *Contractor* is to supply own sanitary facilities at his *Contractor's* yard/area. A refuge control system will be established by the *Contractor*. The *Contractor* submits all safe disposal certificates and waste manifests *Project Manager*.

#### 5.1.11.9 Communications and Correspondence

1. Minutes of any meeting will not be regarded as Communications under the contract in terms of Clause 13 of the Core Clauses.
2. All communications are to be in terms of Clause 13 of the Core Clauses.
3. All communications from the *Contractor* must carry the contract number and title, and is numbered sequentially on the basis of the communication source.

#### 5.1.11.10 Medical Facilities

1. In addition to the requirements in section 5.1.4, the *Contractor* must supply valid medical certificates testifying to the health and the fitness for duty in respect of each employee who requires access to site. Access to site shall not be granted without proper documentation.
2. The *Contractor* shall provide all other medical needs for its employees and sub-*Contractor*s.

### 5.1.12 Facilities provided by the *Contractor*

1. The *Contractor* is responsible for arranging and provides at his own expense all accommodation and meals for his employees.
2. The *Contractor* is responsible for the provision of his own accommodation for all his employees engaged in the execution of the works. This includes the needs of his Subcontractors. The cost for accommodation, as well as for transportation to and from Site is to be included in the Contract Price.

### 5.1.13 Existing premises, inspection of adjoining properties and checking work of Others

The *Contractor*, in conjunction with the *Project Manager* inspects the Site prior to possession. Any defects established during this inspection are listed on the possession certificate. The *Contractor* is responsible for any defect or damage to plant not listed on the possession certificate which occurred during installation.

### 5.1.14 Survey control and setting out of the works

1. The *Project Manager* designates the working area boundary limits and assigns for the *Contractor's* use access roads, parking areas, storage areas, existing facilities areas and construction areas. The *Contractor* does not trespass in or on areas not designated for his work.
2. The *Contractor* is responsible for keeping *Contractor's* personnel out of areas not designated for *Contractor's* use, except, in the case of isolated work located within such areas for which the *Contractor* is authorised to do so.
3. The control points will be established by the *Contractor*. Land surveys will be done by the *Contractor* before and after clear and grub, before and after topsoil strip and after final excavation before construction commences.
4. The *Contractor* will ensure that application for excavation permit is done well in advance before any excavation work can start in an area. The *Employer* will need the drawings of the work to be conducted in the area to show the Excavation authorised person of the *Employer*'s designated sites the drawings, so that an excavation permit can be issued. A copy of the excavation permit with the drawings will be handed to the *Employer* for record keeping.

### 5.1.15 Excavations and associated water control

Not applicable.

### 5.1.16 Underground services, other existing services, cable and pipe trenches and covers

Not applicable.

### 5.1.17 Control of noise, dust, water and waste

1. The *Contractor* maintains a high standard of cleanliness during the conduct of his activities at the *Employer*'s selected sites. This includes areas allocated for storage of materials, site offices etc. to the satisfaction of the *Project Manager*. The *Contractor* keeps these areas clean and free from accumulation of waste materials and refuse regardless of the source.
2. The *Contractor* is responsible for the prompt removal of all waste to a designated disposal area. The disposal area will be on or in the vicinity of the Power Station and be indicated by the *Project Manager*.
3. For the purpose hereof, "waste" any matter, whether liquid or solid or any combination thereof, which is a by-product, emission, residue or remainder of any process or activity carried out in connection with the

works and which is not reused on the Site in the in the ordinary course of carrying out the works within seven days of production.
4. The *Contractor* provides an adequate number of marked bins and containers at offices, in yards, at workshops and on the Site for the temporary storage of waste. These bins and containers are subject to approval by the *Project Manager*. The *Contractor* is required to segregate certain items of waste by type as designated by the *Project Manager*.
5. Bins and containers are emptied and waste removed to the designated area at least once a week. All the waste removed to the designated area at least once a week. All the temporary storage areas for bins and containers are kept tidy and must not constitute a nuisance to others. The *Contractor* takes all required steps to avoid spillage of waste alongside the bins and containers during removal and disposal thereof.
6. All waste that cannot be contained in either a bin or container is placed on a temporary waste site which the *Project Manager* identifies. The waste is removed as soon as possible but in any event at least once a week. No burning of waste and littering is allowed at the Power Station.

### 5.1.18 Sequences of construction or installation

1. The *Contractor* is responsible for the construction and installation of the equipment according to the *Contractor's* construction and installation plans.
2. The *Contractor* complies with the *Employer*'s Work Co-ordination Process.
3. Without derogating from the provisions of the Conditions of Contract, the Work Co-ordination Process is used by the *Project Manager* to monitor and manage activities at the *Employer*'s selected sites and to facilitate the integration and co-ordination of the various works by Others.
4. If not included in the contract, the *Project Manager* will notify the *Contractor* of the requirements of the Work Co-ordination Process prior to the date of site establishment by the *Contractor.*

### 5.1.19 Giving notice of work to be covered up

The *Contractor* gives 24 hours advance written notification to the *Project Manager* of work to be covered up.

### 5.1.20 Hook ups to existing works

The adjacent plant and equipment may not be modified without written permission from the *Project Manager.* The *Contractor* complies with Eskom Life Saving Rules and will report any non-conformance.

## 5.2 Completion, testing, commissioning and correction of Defects

### 5.2.1 Work to be done by the Completion Date

On or before the Completion Date the *Contractor* shall have done everything required to Provide the Works. The *Project Manager* cannot certify Completion until all works has been done and is also free of Defects which would have, in his opinion, prevented the *Employer* from using the *works* and Others from doing their work.

### 5.2.2 Use of the works before Completion has been certified

The *Employer* uses the works, without taking over the works, before Completion for the commissioning, optimization and capability testing of the works and associated plants.
The *Project Manager* utilises Plant and Materials before Completion if there is an emergency which can result in production losses of any of the power station units. The *Project Manager* notifies the *Contractor* of the requirement for Plant and Materials to be utilised to prevent production losses. The time frame for the use of Plant and Materials is agreed upon between the *Project Manager* and the *Contractor*

### 5.2.3 Materials facilities and samples for tests and inspections

Not applicable.

### 5.2.4 Commissioning

Commissioning is required before the completion of the Works. The *Contractor* shall submit an installation and commissioning methodology as described in section 3.1.7 of this document.

### 5.2.5 Start-up procedures required to put the works into operation

1. The *Contractor* gives the *Project Manager* written notice that the works are ready for energisation. Such notice will suit the requirements of the *Employer* but will not, unless otherwise agreed, be less than 48 hours or more than fourteen (14) calendar days.
2. No alterations or adjustments will be made to the works after functional checks are done without the *Project Manager's* written permission.

### 5.2.6 Take over procedures

Take over is after completion.

### 5.2.7 Access given by the *Employer* for correction of Defects

Clause 43.4 requires that the *Project Manager* arranges for the *Employer* to allow the *Contractor* access to and use of a part of the works which has been taken over if needed to correct a Defect.

### 5.2.8 Performance tests after Completion

Refer to section 3.1.14 of this document.

### 5.2.9 Training and technology transfer

Refer to section 3.1.15 of this document.

### 5.2.10 Operational maintenance after Completion

Not applicable.

# 6 Plant and Materials standards and workmanship

## 6.1 Investigation, survey and Site clearance

The *Contractor* is responsible for the complete surveying and setting out of the works including establishment of any benchmarks required to complete the works.
The *Contractor* confirms the available space in the proposed area for the design of the RTM system area taking note of all existing services, fencing, structures and any obstructions to the works.

## 6.2 Building works

Not applicable.

## 6.3 Civil engineering and structural works

Not applicable.

## 6.4 Electrical & mechanical engineering works

The *Contractor* shall use acceptable international standards – IEC, IEEE, SANS.

## 6.5 Process control and IT works

Refer to section 3.1 detailing the *Employer*'s requirements regarding the web-based data acquisition system for the RTM system.

# 7 List of drawings

## 7.1 Drawings issued by the *Employer*

The *Employer* shall provide the *Contractor* with the necessary drawings to complete scope of works, upon request from the *Contractor*.

# C3.2 *CONTRACTOR'S* WORKS INFORMATION

This section of the Works Information will always be contract specific depending on the nature of the *works*. It is most likely to be required for design and construct contracts where the tendering *Contractor* will have proposed specifications and schedules for items of Plant and Materials and workmanship, which once accepted by the *Employer* prior to award of contract now become obligations of the *Contractor* per core clause 20.1.

Typical sub headings could be

a) *Contractor's* design
b) Plant and Materials specifications and schedules
c) Other

This section could also be compiled as a separate file.