Eskom	Scope of Works	Generation

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1. Introduction

Kriel Power Station (KPS) commissioned its last unit in 1979, and at that time it was the largest coal-fired Power Station in the Southern Hemisphere, equipped with 6 Units, generating 500MW each and an installed capacity of 3000 MW. Three of the 6 Units, namely Units 1,2 and 3, were later derated to 430MW thus reducing the installed capacity to 2790MW.

KPS has been in service for over forty years which has resulted in the deterioration of civil infrastructure such as the following:

- Station buildings
- Conveyers
- Support Structures – pump bases, plinths, dumping device supports etc.
- Critical Structures – Chimney Structures, Cooling towers, Boiler and Turbine houses.
- Roads

This document details the works required to repair defects on the various civil infrastructure available within the properties of Kriel Power Station. This Scope of Works makes provision for works that can only be conducted on opportunity (Outages) and the provision of Civil Maintenance Services and Resources. For ease of reference, the Scope will be presented in two sections, namely Outages and Civil Maintenance.

2. Supporting Clauses

2.1 Scope

The appointed Contractor must note that appointment is based on an as and when required basis and must make the necessary provisions for such a contract.

2.1.1 Outage Structural Repairs Scope

The Scope of Work for the Civil and Structural Repairs for Outages includes, but not limited to, the following:

- Detailed assessments of all support structures
- The development of remedial measures.
- Repair of all associated defects
- making safe all additional fixtures such as safety rails.

Based on the operations in KPS, most of the works detailed in this document will be restricted during normal operations as a result of plant requirements and potential exposure to hazards. It must therefore be noted that the works will be executed during Outages (MO and/or GO).

This will therefore require the appointed Contractor to ensure that they familiarize themselves with the duration of the Outages and to ensure that they adhere to all stipulated time frames for the duration of the respective outages. The scheduling and execution of the works will therefore be under tight time frames, to ensure a stable EAF and continued uninterrupted energy supply to the country.

2.1.2 Civil Maintenance Scope

The Civil Maintenance section of this scope includes, but not limited to, the following:

- Structural steel repairs or replacement in critical structures. (including turbine and boiler houses, and precipitator structures)
- Station roads maintenance includes all surfaced roads and unsurfaced roads with exception of roads within the ash dam complex.
- Raw water and pollution control dam maintenance in line with statutory recommendations
- Water and sewage plant maintenance
- Maintenance of general buildings (including workshops, administrative buildings and other occupied buildings)
- Repairing of existing ash dam and coal stockyard concrete lined solution trenches.
- Repair/ replacement of stormwater infrastructure, including culverts, channels and catchpits.
- Provision of human resources necessary to execute the required works
- Painting
- Repair or replacement of all cladding and roof sheeting

2.1.3 Purpose

The purpose of this scope of works is therefore to:

- Evaluate, quantify, and establish the severity of all defects.
- identify dedicated remedial works to be performed to ensure safe operations of the plant.
- Upon acceptance/ approval by the Employer, execute the required remedial works in line with the Occupational Health and Safety Act [Act 85 of 1998] and the Construction Regulations 2014.
- Ensure completion within the approved schedule, to allow for the commencement of production activities and normal day to day operations.

2.1.4 Applicability

This document shall apply to Kriel Power Station Outages and Civil Maintenance.

2.2 Normative/Informative References

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

2.2.1 Normative

[1] ISO 9001 Quality Management Systems

[2] GGS 0462 Eskom Quality Requirement

[3] 240-105658000 – Supplier Quality Management Specification

[4] 240-106628253 – Standard for welding requirements on Eskom Plant

[5] 240-106365693 – Standard for the External corrosion protection of plant, equipment, and associated piping with coating.

[6] 240-56364545 – Structural Design and Engineering Standard

[7] 240-99527377 – Inspection Manual for Civil Works at Eskom's Power Stations

[8] 240-144332407 – Guideline for Eskom Power Stations Concrete Remedial Work

2.2.2 Informative

[9] National Environmental Management Act (Act No. 107 of 1998)

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

[11] Occupational Health and Safety Act (Act 85 of 1993)

[12] Construction regulations 2014.

[13] Engineering Survey for Concrete Infrastructure Stability and integrity assessment

[14] 240-142483465 – Guidelines on the Maintenance and Rehabilitation of Roads

[15] COTO TNH 9 Part A – Manual for visual assessment of road pavements; Part A: General

[16] COTO TMH 9 – Manual for visual assessment of road pavements; Part B: Flexible Pavements

[17] COTO TMH 9 – Manual for visual assessment of road pavements; Part C: Concrete Pavements.

[18] COTO TMH 9 – Manual for visual assessment of road pavements; Part E: Unpaved Roads

[19] TRH12: 1997 – Flexible pavement rehabilitation investigation and design

2.3 Definitions

Table 1: Definitions

Definition	Description
Employer	Kriel Power Station and, by extension, Eskom will be referred to as the Employer. The Employer will appoint a representative to manage and ensure the Employers interests are protected.
Competent Person	A person who has in respect of the work or task to be performed; required knowledge, training; experience and where applicable; qualifications specific to that work or task (Construction Regulations, 2014).
Contractor	An employer/entity who performs construction work and is sanctioned by the respective regulatory, through valid registration, to undertake the relevant construction work.
Construction Manager	A competent person responsible for the management of the physical construction processes and the coordination, administration, and management of resources on a construction site.
Construction Supervisor	A competent person responsible for supervising construction activities on a construction site.
Inspector	A civil or structural Designer, Plant Engineer or Plant Foreman who have been specifically trained in how to conduct structural inspections and has experience in structural inspections
Outage	Generating unit being placed offline to allow for maintenance activities to be undertaken, particularly in sections that cannot be accessed while the Unit is onload
Registered Person	An Engineer or Engineering Technologist registered with ECSA, specialising in, and having experience in, the design of respective civil engineering assets
Safety Critical item	A safety item is any asset element where the deteriorated condition constitutes an immediate risk to the safety of personnel in the plant
Temporary works	Any falsework, formwork, support work, scaffolding, shoring or other temporary structure designed to provide support or means of access during construction work.
The Act	Refers to the Occupational Health and Safety Act (Act 85 of 1993)

*Note: All reference made to the masculine, equally and unequivocally applies to the feminine.

2.4 Abbreviations-+

Table 2: Abbreviations

Abbreviation	Explanation
ECSA	Engineering Council of South Africa
EDWL	Engineering Design Work Lead
EMP	Environmental Management Plan
KPS	Kriel Power Station
MSL	Mean Sea Level
NEC 3 TSC	New Engineering Contracts 3 – Term Services Contract 2013
OHS	Occupational health and safety
Pr. Eng	Professional Engineer
Pr. Tech. Eng.	Professional Engineering Technologist
QCP	Quality Control Procedures
SANS	South African National Standards
SOW	Scope of Work

2.5 Roles and Responsibilities

2.5.1 Employer

- Prepare a baseline risk assessment for the intended construction works.
- Prepare a suitable, sufficiently documented, and coherent site-specific health and safety specification for the intended construction work based on the baseline risk assessment.
- Include the health and safety specification in the tender documents.
- Ensure that the Contractor to be appointed has the necessary competencies and resources to carry out the construction work safely.
- Ensure that a copy of the Contractor's health and safety plan is available on request to an employee, inspector, or Contractor.
- Stop any contractor from executing a construction activity which poses a threat to the health and safety of persons which is not in accordance with the Employer's health and safety plan for the site.
- Where changes are brought about to the design or construction work, make sufficient health and safety information and appropriate resources available to the Contractor to execute the work safely. Provision of resources shall be done in line with the NEC 3 ECC conditions of contracts and the contract data through compensation events.

2.5.2 Contractor

- The contractor is responsible for the safe construction, commissioning, and handover of the works in line with this scope of works and the relevant contract documents.
- Provide and demonstrate to the Employer a suitable, sufficiently documented, and coherent site-specific health and safety plan, based on the Employer's documented health and safety specifications, which plan must be applied from the date of commencement of and for the duration of the construction work and which must be reviewed and updated by the Contractor as work progresses.
- Open and keep on site a health and safety file, which must include all documentation required in terms of the Act and the Construction Regulations 2014, which must be made available on request to an inspector, the Employer, the Employer's Agent, or a Contractor
- The Contractor remains responsible for all Sub-Contractor's appointed for the works. The Contractor must ensure:
    - All sub-contractors appointed to perform the construction work for the Contractor are provided with the relevant sections of the health and safety specifications.
    - Ensure that no Sub-contractor is appointed to perform construction work unless the Contractor is reasonably satisfied that the Sub-contractor has the necessary competencies and resources to perform the construction work safely.
    - Stop any sub-contractor from executing construction work which is not in accordance with the Employer's health and safety specifications and the Contractor's health and safety plan for the site or poses a threat to the health and safety of persons and the environment.
    - Within reason, ensure co-operation between all Sub-contractor's appointed by the Contractor to enable each of those contractors to comply with the Act and the Construction Regulations.
    - That all construction site records of the health and safety induction are made available on request by an inspector, the Employer and the Employer's agent.
- For every new task, the contractor must provide a detailed method statement identifying all the activities that will be undertaken to successful complete the said task.
- The Contractor must, before the commencement of any construction work and during such construction work, have risk assessments performed by a competent person appointed in writing. The risk assessments will form part of the health and safety plan to be applied on site and must include the following:
    - The identification of the risks and hazards to which persons may be exposed to
    - An analysis and evaluation of the risks and hazards identified based on a documented method statement.
    - A documented plan and applicable safe work procedures to mitigate, reduce or control the risks and hazards that have been identified.
    - A monitoring and review plan.

2.6 Process for Monitoring

N/A

2.7 Related/Supporting Documents

Refer to Section 2.2.2

3. Scope of Work

3.1 Outage Civil and Structural Repairs

3.1.1 Background

During the energy generation processes at Kriel Power Station, various components are subjected to cyclic loading, severe corrosive environments, thermal loading, and impact loading. This is the case for a number of civil structures that house or support critical machines that assist in generating the required energy.

These structures include, but not limited to, the following:

- Pump and fan bases
- Sumps
- Pipe support structures

As part of the planned outages, it is imperative that these structures are assessed for defects and repairs to be undertaken timeously to ensure the safe continued use of the plant. This document therefore details the extents of work that must be undertaken to achieve the aforementioned safe operations.

3.1.2 Scope Summary

The scope of works requires the appointed Contractor to carry out inspections, and subsequent repairs, as and when required, during unit outages. The battery limits for the outage scope are presented in Table 3 below.

Table 3: Battery limits

Plant	Start	End	Exclusion	Inclusions
Blow Down Sumps	Blowdown sump inlet	Blowdown sump outlet	Mechanical Components	Concrete and steel components
Ash Sumps	Sluiceway ash sump inlet	Ash sump outlet	Mechanical components	Concrete and steel components
Ash Pump bases	Base Plate	Existing floor slab	Mechanical components	Concrete and steel components
Sluice Pump bases	Base Frame	Existing floor slab	Mechanical components	Concrete and steel components
Seal water Pump bases	Base plate	Existing floor slab	Mechanical components	Concrete and steel components

Plant	Start	End	Exclusion	Inclusions
Ash hopper cooling bases	Base plate	Existing floor slab	Mechanical components	Concrete and steel components
ID fan plinths	Base slab	Existing floor slab	Mechanical components	Concrete and steel components
FD fan Plinths	Base slab	Existing floor slab	Mechanical components	Concrete and steel components
PA fan Plinths	Plinth and slab	Existing floor slab	Mechanical components	Concrete and steel components
Ash line support structure	Pump discharge point	Dry sump walls	Mechanical components	Concrete and steel components
Ash pump V-Belt guide	Structural steel support and holding down bolts	v-belt guide cage	Mechanical components	Concrete and steel components
Dumping device support structure.	Supporting slab and holding down bolts.	Support brackets	Piping and mechanical components	Concrete and structural steel members

3.1.3 Contractor's Assessment

Upon site establishment and the emptying and cleaning of all sumps and the removal of all associated machinery on bases detailed in Table 3 above, or as required by Civil Maintenance, the appointed Contractor "must" conduct a detailed condition assessment of all sumps, bases, pipe supports and belt guides. The appointed Contractor "must" provide a detailed assessment report that indicates the following:

- Degree of degradation
- Extents degradation
- Non-destructive tests to be conducted, where applicable
- Suitability for repair or replacement (Based on extents of degradation)
- The Contractor is also required to provide remedial measures for structural steel and concrete defects, such as spalling, and execute the repairs upon approval by the Employer.

The report must contain an appendix or annexures that contain pictures of the degradation identified during the assessment. In order to ensure consistency of reporting and common understanding of the severity of deterioration of plant structures, five condition categories are used, as defined in Table 4 below.

Table 4: Condition Categories

Category	Description	% Original Strength	Typical Remedial Action
0	The plant assets are in excellent condition with no deterioration evident. Safe use of the plant assets is assured.	100	None Required
1	The plant assets have slight evidence of surface deterioration, but to an extent that there is no reduction in strength.	100	None Required
2	The plant assets have some deterioration to an extent that there is slight reduction in strength. Safe use of the plant assets is assured.	95-100	Repaint, tighten bolts, other minor work
3	The plant assets show deterioration, to an extent that there is some reduction in strength. There is some compromise to safe use of the plant structure. Repair must receive attention in maintenance scheduling.	75-95	Repair, repaint, tighten bolts, other minor work
4	The plant assets show severe deterioration, to an extent that there is a major reduction in strength. Safe use of the plant is severely compromised. Urgent attention must be given to repair.	50-75	Repair or replace components
5	The plant assets show severe deterioration, to an extent that they have little useful residual strength. Safe use of the plant is impossible. Urgent attention must be given to repair.	< 50	Repair or replacement of components required urgently

3.1.4 Quenching and Blow Down Sumps

These are reinforced concrete sumps that contain water. Water functions as a quenching medium for the steam from the boiler plant. Typical problems experienced in the sumps include, but not limited to, the following:

- Sumps were not designed for high temperature water in sumps therefore quenching water dissolves the cement matrix. Water leaks into surrounding backfill material or mill foundation sumps.

- Decreased cover, therefore allowing moisture to penetrate the concrete and corrode the rebar.
- Overflow line drains into the bottom boiler ash sumps where overflow water is pumped to the ash dams. Overflow flow pipeline gets blocked with ash, resulting in pressure build up in the quenching sump.
- Temperature cracks, corrosion, spalling, and exposure of aggregates.
- No lining of sumps where concrete has deteriorated.
- Inadequate drainage capacity.
- Holes in walls which results in drainage of quenching water.

In previous assessments, cracks were noted on the walls as well as structural cracks to the soffit of the roof slab at the sumps. The wall, floor and slab of the blowdown sump were repaired with shotcrete in previous outages. The cracks on the sump walls could be attributed to various factors such as thermal cracking, sulphate attacks and settlement cracking. The cracking could induce spalling by exposing the reinforcement to contaminated water, resulting in oxidation of the reinforcement which increases internal pressures, resulting in spalling.

Cracks, aggregate exposure, spalling and reinforcement exposure were common defects observed in the sumps across the six units. Greater severity of corrosion was observed at construction joints and interfaces between inlet/outlet pipes and manhole frames.

The scope of works includes, but not be limited to, the following:

- The existing layer of shotcrete is to be removed taking care not to damage the underlying structural concrete.
- A structural assessment report, which will deal with the structural integrity of the sump, must be provided by the Contractor. The assessment must detail the condition of every aspect of the sumps, identifying all defects and categorised in line with Table 4 above.
- Concrete repairs are to then be done as recommended by the Contractor's structural engineer and accepted by the Employer's Engineer.
- A protective shotcrete layer is to be applied onto the concrete post the execution of the approved repairs.

3.1.5 Concrete Pump Bases

These section details the assessment and repairs of all pump bases listed in in Table 3 above.

3.1.5.1 Dismantling of pump up to the concrete base and holding down bolts

The pump and pump base plate must be removed by the Contractor's responsible for the mechanical components supported by the bases. The removal of equipment must be coordinated by the respective outage coordinator. Assessments, as detailed in Section 3.1.3 above, must be completed by the Contractor's registered person with the Employer's Engineer to accept the findings.

3.1.5.2 Concrete Strength Testing

a) Core drilling:

Cut out a core by means of an accepted rotary cutting tool, the cores must conform to the perpendicular and planeness requirements, they shall be sawed or ground to meet those requirements or capped as per standard procedure.

Compressive strength testing of the core as per the relevant SANS standard must be done by a recognized laboratory and the results presented to the Employer for acceptance.

If the concrete strength test is considered successful, the concrete base must not be replaced. A pullout test on the existing holding down bolts must be conducted by the contractor. Otherwise, the concrete base is to be replaced.

b) Other tests

The Contractor may employ non-destructive tests such as the Schmidt Hammer test to establish concrete strength. These tests must be conducted by a competent person, taking into account all corelations with the concrete strength and the necessary calibrations. The findings of such a test must be signed off by the competent person. Calibration certificates must be produced by the Contractor upon request by the Employer.

3.1.5.3 Concrete Base Replacement

Where the degree of degradation is severe, such that minor concrete repairs will not suffice; upon agreement with the Employers Engineers, the existing concrete base may be demolished and the existing holding down bolts and reinforcement are to be removed and discarded. The replacement of the concrete basis includes, but is not limited to, the following:

- The footprint area of the concrete base is to be adequately scabbled to allow for bonding. The Contractor must provide adequate temporary works to sufficiently support the new concrete.
- Erect temporary works sufficient to support concrete from the floor to the required height.
- Steel fixing to be done as per the provided drawing; Y16 reinforcement bars are to be doweled into the existing slab at 200mm spacing as per the reinforcement drawing detail issued. A chemical anchor product with the required strength is to be submitted for approval. A method statement and risk assessment detailing the bars installation and the related risks must be submitted for approval prior to the commencement of the works. Care must be taken to align with all the drilled hole requirements as well as application steps specified in the supplier's data sheet. The reinforcement is to be inspected by the employer's engineer prior to concrete casting.
- L-shaped holding down bolts to be installed prior to concrete pouring, the bolts are to be as specified in the drawing provided. Emphasis is placed on dimension C in the picture below to be 150mm minimum. Dimension L – T is to equal the foundation base thickness as specified in the drawing; The bolt must be threaded to its full length. Approved method can be used to hold the bolt in place during casting to ensure it is positioned in the accurate required position. Figure 1 below depicts a typical holding down bolt elevation.

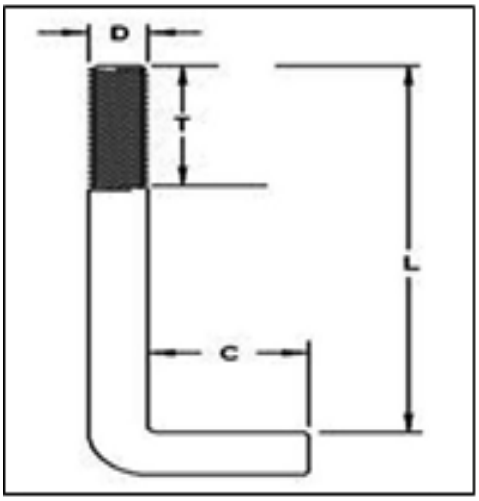

Figure 1: Typical holding down bolt elevation.

- A C100 x 50 galvanized channels shall be fixed in position and monitored during casting as per the existing construction drawings to allow for the base plate to be positioned for bolting of the pump base plates. The contractor shall ensure that the channel remains in place during concrete casting.
- Prior to casting, the old concrete shall be kept wet continuously for a minimum of 24 hours, alternatively the contractor can apply an approved bonding agent to be followed by casting.
- Standard concrete casting procedure to be followed as per SANS 2001 – CC1 is to be followed during casting, Concrete is to be vibrated during casting. The contractor is required to take three concrete cubes samples for strength testing by an accredited lab. The lab shall conduct compression tests at 7, 14 and 28 days to confirm if the required strength of 30Mpa is met. The results must be submitted to the engineer; If the test results do not meet the required standards, the concrete bases shall be demolished and started afresh at the Contractor's cost. Eskom engineering's acceptance of the works does not relieve the contractor of their responsibility.
- Concrete curing to be allowed for as per SANS2001 – CC1.
- Provide a detailed method statement and risk assessment for approval, prior to construction.

3.1.5.4 Concrete Base Repair

Where the existing concrete base is noted to be in a reasonable condition and minor concrete repairs will suffice, the following must be undertaken by the appointed Contractor:

- Perform pull-out test on existing hold down bolts to ensure that they have sufficient capacity.
- If the bolt fails, the pull-out test, the appointed Contractor must replace the existing bolts.
- New holding down bolts must be installed using an approved chemical anchor. The installation must be preceded by a detailed method statement and risk assessment. Bolts must be highly corrosive resistant, high yield strength to withstand vibrations from the pump and of the same diameter as specified by the drawings or by the engineer.
- Chemical anchors to be installed as per the manufacturer's specifications.
- Install bolts according to an approved method statement and risk assessment.

- Allow the chemical anchor to cure in accordance with the manufacturer's specifications.
- After the curing period, conduct a non-destructive pull-out test on the bolts to check the strength of the bond.

Chemical anchor product and bolt must conform to the following and must be submitted for the Employer for approval:

- suitable for non-cracked concrete C 20/25 to C 50/60.
- high loading capacity
- suitable for dry and water saturated concrete.
- large diameter applications.
- high corrosion resistance.
- anchorage length must be sufficient so that the mode of failure would be failure of the bolt and not pull out.
- Pull out test to be conducted on all the bolts after installation to ensure that they meet the required strength.

All holding down bolt replacements must be in accordance with the Standard for Eskom Power Stations Concrete Remedial Work 240-144332407. The Contractors professional engineer must propose the method and repair products to complete the works.

Care must be taken when installing the holding down bolts to comply with all pump alignment tolerances. Replace steel base plate with a new one if deemed necessary by the structural engineer and agreed with the Employer's Engineer.

3.1.6 Ash Pump Discharge Line Supports

This section focuses primarily on the holding down bolts of the discharge support line that might have failed by pulling out or have been found to be loose. The appointed Contractor must execute the works in accordance with Sub-section 3.1.5.3 above. All damage or corroded structural steel members to be replaced on a like for like basis unless agreed otherwise with the Employer.

3.1.7 Replacement of existing base plate or steel frame.

Where there have been issues identified with the existing base plate or steel frame, the Contractor, in agreement with the Employer's Engineer, may be required to replace the affected base plate or the existing pump steel frame.

Where the relevant findings and subsequent calculations permit, the Contractor may be required to replace the base plates on a like for like basis, or if there is a need for a change in plate or member sizes, a newly designed plate or frame may be installed. All new plate or frame sizing that may be required, must be accompanied by a signed report from the Contractor's Structural Engineer and the respective drawings signed for construction.

3.1.8 ID, FD, and PA Fan Plinth Repairs

The appointed Contractor must assess and report on the condition of the ID, FD, and PA fan plinths during the outage of a Unit. The Contractor will be required to provide a detailed investigation report that will be signed by the Contractor's registered person. The aforementioned assessment report must discuss the current condition of the plinths, provide remedial measures for approval by the employer and the respective bill of materials and quantities of the proposed works.

Common defects that have been identified on the aforementioned plinths, include but are not limited to, the following:

- Severe spalling
- Loss of concrete cover
- Cracking
- Loss of aggregates.

The appointed Contractor must provide the required repair methodology and the relevant risk assessment for approval by the Employer, prior to commencement of any works.

3.1.9 Ash Pump V-Belt Guide Structure

The appointed Contractor must assess the V-belt guide steel structure to ensure that it is still structurally suitable for its function. The Contractor must consider the following:

- The condition of the structural steel members, which mut include the following:
  - degree of corrosion.
  - buckling or warping of structural steel members.
  - Condition of guards.
- Condition and capacity of the holding down bolts.
- Condition of the floor slab that the guides are connected to. This must indicate any honeycombing, spalling and any other concrete defect that might affect the structural integrity of the guides and of the floor slab.

In line with the general scope, the appointed Contractor will be required to provide a detailed assessment report, that will report on the full extents and degree of the defects.

3.1.10 Dumping Device Support Structure

In line with any relevant requirements from Turbine Engineering and any Civil and Structural Requirements, the appointed Contractor will be required to assess the support structure of the dumping device and the respective holding down bolts, on an as and when required basis. Where applicable, the Contractor will be required to test the capacity of the existing holding down bolts and repair or replace the bolts in line with sub- section 3.1.5.3 and 3.1.5.4 of this report. Where deviations from the aforementioned sub-sections are required, the Contractor's proposal must be submitted to the Employer for acceptance by the Employer's Engineer, prior to the commencement of any repair works.

Where a relocation might be required, for whatever structural requirement, the appointed contractor must conduct GPR scanning to identify all existing reinforcement and mark the position of the new bolts. These positions must be accepted by the Employer's Engineer prior to any drilling or coring of the existing concrete slab or columns.

The Contractor must assess the structural concrete elements for any defects that require repair works for approval by the employer.

3.1.11 Painting

The appointed Contractor's painting scope includes, but not limited to the following:

- Provision of skilled and unskilled resources to supervise and undertake all painting requirements stipulated by the employer on an as and when required basis.
- Component painting in line with the instruction by the Employer.
- Adherence to good painting industry standards, which includes the provision of paint coatings that a competent and experienced painting contractor ought to have known.

The minimum scope of the appointed Contractor's includes, but not limited to, the following:

- Sootblower casings
- Various boards
- Metallic walls
- Railing
- Structural steel supports.

As stipulated above, the scope includes the provision of adequate and competent resources. This includes the following resources:

- Painting Supervisors (2 No.)
- Painting QC inspector
- Painters (15 No.)

3.2 Civil Maintenance Resources and Services

3.2.1 Concrete Structures

The appointed Contractor will be required to undertake general repairs on the concrete structures to address general defects such as spalling, minor cracking and honey combing. These structures include, but not limited to the following:

- Turbine house concrete structures (units 1-6)
- AWR system pump bases (including holding down bolt replacement, chemical anchoring and base plate replacement).
- Cooling towers 1-4 shell (internal and external) and all staircases leading into the cooling towers.
- Clarifiers
- Coal staithes

- High Level effluent dam spillway and culverts
- Ash dam and Coal stockyard solution trenches in line with document 555-EAP2079- Scope of works for Construction, lining as well as repairing of concrete solution trenches attached in Annexure A.
- Cable trenches concrete repairs and structural steel element replacement.
- Chimney Structures – limited to the bottom 20 metres and the repair or replacement of additional fixtures such as lightning protections and walkways.

The appointed Contractor shall not undertake any major structural repairs of structural elements that may place the structure in immediate risk of collapse. Should such work be authorised by the Employer for the appointed Contractor to execute, the appointed Contractor must provide a suitably experienced team, including a registered structural engineer with no less than five (5) years post ECSA registration, as a professional, experience.

3.2.2 Structural Steel Repairs

The repair of structural steel will be limited to a like for like replacement, unless otherwise advised by the Employer. Where issues of capacity have been identified, the appointed contractor must provide a detailed design of alternative structural steel member sizes for approval by the Employer. The appointed Contractor will be required to undertake cleaning of corroded structural steel members and providing the relevant corrosion protection measures in line with the Eskom Standards.

Where missing steel sections are identified the appointed contractor must have the capacity to replace such members and to repair any damaged connections; this includes welding and the replacement of bolts in line with the relevant SANS standards.

The structural steel repairs include, but not limited to, the following structures:

- Boiler house structures
- Turbine house steel structures
- Precipitator structures (units 1-6)
- Cooling tower steel staircases.
- Conveyor belt structures (including tail end and drive houses)
- Flue ducts
- Main Silo Structures

The appointed Contractor shall not undertake any major structural repairs of structural elements that may place the structure in immediate risk of collapse. Should such work be authorised by the Employer for the appointed Contractor to execute, the appointed Contractor must provide a suitably experienced team, including a registered structural engineer with no less than five (5) years post ECSA registration, as a professional, experience.

3.2.3 General Buildings

The appointed Contractor shall be responsible for the maintenance of general buildings within Kriel Power Station. The general buildings including but not limited to, the following:

- Main building
- Engineering building
- All workshops
- Soweto and Indaba buildings (including the canteen and park homes)
- Water treatment plant buildings and pump houses
- Sewage treatment plant operators building and storerooms.
- Stores buildings
- Substation buildings and switchgear rooms
- Pump houses

The appointed contractor shall ensure that all brickwork and minor concrete repairs are completed. The contractor must ensure that all drainage systems are clear of debris and have no leaks, this includes gutters, and downpipes. The Contractor must replace all damaged finishes such as tiles (wall and floors) and carpets as instructed by the Employer.

3.2.4 Plumbing and Carpentry

Unless explicitly stated otherwise by the Employer, all works under this section must be deemed to be a supply, deliver and install. The appointed Contractor shall be responsible and liable for all equipment, materials or plant that is at transit and storage (off site and on site); until such time that the works/material have been handed over and accepted by the Employer.

3.2.4.1 Plumbing

The plumbing scope includes, but not limited to, the following:

- Maintenance of septic tanks in line with the agreed contracts for the Contractor’s yard.
- Unblocking of sewerage pipelines and lavatories.
- Provision of new sewage pipelines in line with engineering requirements.
- Provision of honey sucker trucks for the draining of blocked sewerage systems
- Replacement of all damage manhole covers.
- Installation of new toilets (price to include all fittings and cisterns)
- Installation of all sanitaryware fittings and finishes.
- Installation of new or repair of existing potable water pipelines (prices to include fittings)
- Provision and operation of HP cleaning machinery.

3.2.4.2 Carpentry

The carpentry scope includes but not limited to the following:

- Construction and remodelling, retrofitting, and repair of all wooden finishes, including all dry walling.
- Install and repair furniture.

- Repair and maintain building roofs
- Repair or replace wooden doors (Prices to include all fittings and finishes)
- Build required items including speciality furniture.
- Construct shuttering for concrete pouring.
- Repair or build floors, timber wall frameworks and roofs.
- Replace or repair ceiling and associated finishes and lighting.
- Supply and install prefabricated units.
- Supply and install all handles, locks, hardware, insulating material and other critical finishes.
- Supply and delivery of all carpentry related materials.

3.2.4.3 Glazier

- Supply and install all types of glass, including reinforced glass, tempered glass and plexiglass.
- Remove and replace broken glass in wood or metal framed openings
- Repair and replace window hardware and door closures
- Supply and deliver all required glazier material. Liability at transit remains with the contractor.

3.2.5 Painting

Unless explicitly stated otherwise by the Employer, all works under this section must be deemed to be a supply, deliver and install. The appointed Contractor shall be responsible for all paint at transit and storage (off site and on site). The appointed Contractor shall be liable for all damages and/or losses at transit, storage (off and on site) and at installation. The appointed Contractor shall adhere to all paint manufacture specifications and requirements

The painting requirements include the following:

- Surface preparation, prime, seal, patch and paint furniture, surfaces, buildings, and fixtures using the relevant paint or protection solutions. These include, but not limited to, the following:
  - Varnish
  - Lacquer
  - Shellac
  - Enamel
  - Epoxy
  - Water and oil-based paints
  - Chemical and heat-resistant painting solutions
- Roof (to include, tiled roofs, corrugated sheeting) and fence painting
- Tape, flush, repair and apply texturing wallpaper, and acoustic layers, where applicable
- Floor painting, including all workshops and units. Specifications to be provided by Employer

3.2.6 Roof Repairs

The roof repairs that is discussed on this section refers to all roofs within the station boundaries and all other Kriel Power Station properties. The works include, but not limited to, the following:

- Replacement of gutters and down pipes
- Removing of silt and vegetation in gutters
- Repainting of all steel gutters and down pipes
- Replacing of all damaged sheeting (to include all holding down fixtures and paint)
- Replacement of roof tiles and fascia boards.

Where obsolete materials, such as asbestos, the appointed Contractor shall remove and replace with the latest materials, approved by the employer. The appointed Contractor shall legally and safely dispose of all obsolete materials in line with the applicable regulations.

3.2.7 Bricklaying

The appointed contractor will be required to erect brickwork in accordance with SANS 10400. The following activities will be conducted by the appointed contractor:

- Erecting and demolition of walls
- Erection of brick wall fences and bund walls
- Casting concrete foundations for the walls, where necessary
- Supply and installation of brick-force in accordance with SANS 10400

The appointed Contractor shall not demolish or structurally alter any load bearing walls without the authorisation of the Employer's Engineer.

3.2.8 Equipment Supply

Unless explicitly stated otherwise by the Employer, all works under this section must be deemed to be a supply and deliver. The appointed Contractor shall be responsible for all equipment or plant that is in transit and storage (off site and on site). The appointed Contractor shall be liable for all damages at transit and storage (off and on site) unless the Employer accepts handover. Typical equipment that must be supplied includes the following:

- Grit/Sand blasting Machine (minimum 1000kPa)
- High pressure washing machine (minimum 1000kPa)
- Concrete mixer (120l)
- Submersible pump for dewatering (capable of handling sludge at 100m³/h)

3.2.9 Roads and Stormwater

This scope includes the maintenance of all station roads and the respective stormwater infrastructure. This includes the following:

- All surfaced roads, provision must be made for adequate surface drainage.

- Gravel roads (price to include the supply and installation of the relevant material G2, G5, G7, G9, dump-rock etc.)
- Signage for both gravel and surfaced roads.
- Stormwater pipelines and culverts (including catchpits and grated inlet drains). Price to include the provision of earth berms and erosion protection measures.
- The provision of Subsoil drainage in critical points of existing roads. All subsoil drains must daylight safely and away from all Eskom and public infrastructure. Where energy dissipation is required, the Contractor must make provision for items such as rip rap.

3.2.10 Material Supply

The appointed contractor will be required to supply and deliver material for road repairs as and when required by the employer. The material to be supplied by the contractor is listed as follows:

- G7
  - Natural Material (gravel)
  - Nominal size of uncrushed material: 75mm
- G5
  - Natural gravel, or natural gravel and boulders
  - May contain approved natural fines
  - Nominal maximum size of 63mm (uncrushed) or 53mm (crushed before compaction)
- G2
  - Coarse gravel
  - May contain up to 10% by mass of natural fines
  - Nominal maximum size of 37.5mm
- 19mm stone (to employer's specification)

3.2.11 Earthworks

Where necessary, the appointed Contractor will be required to excavate in all materials for the exposure of services or construction. Only soft, and intermediate material is expected to be encountered during excavations on site.

The contractor must make provision for new earthworks, where necessary, that will be required to ensure stable founding conditions for the station's infrastructure. Such a decision must be guided by the findings of the geotechnical investigations.

The probability of encountering material that would require the efforts outlined in SANS 1200 D and DB for hard rock, are minimal. In addition, the following must be noted by the Contractor:

- The Contractor shall include in the tendered rate, for all required trench excavations, any additional volume of material of which will be required for working space or additional space which may be required for the Contractor for welding bends and joints. No additional payment for excavation shall be made in this regard.

- Where outside shuttering is required, it shall be permitted for an additional width not exceeding 600mm around the structure measured at right angles to the face of the concrete to be shuttered. No payment will be made for excavation exceeding this allowance.
- Excavation equipment: should any portion of the works exceed the specified depth; the Contractor will be held responsible for any additional costs which may arise because of such over excavation. Concrete or imported compacted fill below the bottom of the affected infrastructure may be ordered by the Employer, at the Contractor's expense.

3.2.12 Resources

The appointed contractor must provide the following resources in line with the requirements of the Civil Maintenance department:

- Civil Technician/ Site Manager x1
- Site Supervisor x 1
- Safety Officer x 1
- Heavy duty vehicle operator/ driver
    - Operate/ drive vacuum truck x2
    - Operate/drive excavator and TLB x2
    - Operate 10-ton overhead crane x2
    - Operate HP machines x 2
- General workers x 12
- Structures construction hand x 4
- Shutter hand Grade 1 x 4
- Reinforcement Hand Grade 1 x 4
- Concrete hand grade 1 x4
- Operator
- Light motor vehicle driver
- Supervisor grade 1
- Welder x 2
- Plumber x 3
- Contract manager
- Site agent
- Technician
- Safety officer.

All skilled resources, including drivers and operators, must produce the relevant evidence of competence. This includes all relevant certifications and licenses.

3.3 Typical Concrete Repair Works.

As discussed in Section 1 above, KPS has been in service for over 40 years, and during the course of the stations service life, many structural components have deteriorated due to various factors, such as plant age, and change in operating philosophies.

To address the aforementioned defects, the works detailed in this scope of works include, but not limited to the following:

- Erection of safe and adequate temporary works to allow for the safe execution of the works.
- Sufficient cleaning of the affected structures to allow for assessment and repair.
- Assessment and the provision of remedial measures for the affected structural elements.
- Where necessary, the demolition of any concrete support structure to be approved by the employer.
- Where demolition is not required, the repair of existing support structure for safe operational conditions in line with the Act.
- The repair of severe concrete defects, which will include spalling, loss of cover and chemical attacks on the concrete.
- The provision of adequate protection against the prevailing conditions which includes, but not limited to, paint, mortar, and chemical and heat-resistant grout; to allow for the continued safe use of the support structures.
- The replacement of all obsolete materials such as asbestos or lead based paints and sealants.

The appointed Contractor must consider the following concrete repair methodologies or provide alternatives that will ensure continued safe use of the support structures.

3.3.1 Surface Preparation

All affected areas that will be removed must be marked up. The marked-up areas must be agreed with the Employer and recorded before commencing with any works. All surfaces must be cleaned such that there are no loose materials, surface contaminants and any other material that would affect the bond of the materials used for the repair. All the deteriorated and damaged concrete must be removed by using mechanical means.

The sections that have concrete removed must be cut at an angle of more than 90° but not more than 135° to minimise the risk of shrinkage, debonding and cracking at the existing undamaged concrete. These sections must be sufficiently roughened to provide a key between the original concrete and the repair mortar or grout.

In cases where the depth of repair is in line with the depth of cover to reinforcement and the steel reinforcement is exposed; the concrete removed must continue to expose the entire circumference of the existing reinforcement and an additional 20mm behind the existing reinforcement must be removed. The removal of such concrete must continue along the reinforcement until the non-corroded sections of the bars are exposed, while ensuring that the exposed reinforcement is not cut.

3.3.2 Reinforcement

The appointed Contractor must ensure that all rust, concrete, and other loose debris are adequately removed in order to ensure sufficient bond between the reinforcement and the new mortar. The steel surfaces must be prepared abrasive blast cleaning, or similar approved. In cases where the exposed reinforcement has been subjected to contamination, the reinforcement must also be cleaned by low pressure mechanisms.

3.3.3 Corrosion Protection

The Contractor will be required to ensure that sufficient corrosion protection is provided for the reinforcement post cleaning. A corrosion protection coating must be applied, either by brush or spray, on the prepared reinforcement. The coating must be provided on all sections of the reinforcement. The Contractor must ensure that two coats are applied, and adequate time is provided for the initial coat to set and harden prior to applying the second coat.

3.3.4 Binding Primer

The Contractor must apply the bonding primer into the substrate, filling all of the profile. The repair mortar application will subsequently be done “wet on wet”.

3.3.5 Grouting

The Contractor must ensure that formwork is adequately fixed prior to the mixing of the material and seal the grout tight. The Contractor may use other relevant grouting methods that a suitably qualified and experienced Contractor should deem applicable for the prevalent site conditions. The Contractor must, at all times, ensure that air can escape, as reasonably possible; these methods may include knocking on formwork or rodding the mixture to release air pockets during placement.

3.3.6 Crack Repair

There are several causes of cracks in concrete, these include, but not limited to the following:

- Physical movement
- Thermal changes
- Stress concentrations
- Structural design deficiencies
- Accidents

The Contractor must ensure that the surface, to the full extents of the crack, is wire brushed to remove laitance from the concrete. In cases where the concrete is loose, a V cut, at least 20mm wide and 10mm deep, must be made and all debris removed. The cracks must then be sealed using a repair mortar /grout. Where the crack is chased out, the chase must be filled and finished flush with the concrete surface.

3.4 Material Specifications

3.4.1 Concrete

All concrete work is required to be in accordance with SANS 2001-CC1 and SANS 10100-2 unless otherwise stated. All concrete surfaces and cast-in items are required to be inspected and accepted by the Project Manager in writing before casting of concrete may commence. The following is to be noted and adhered to:

- The Contractor is required to obtain written acceptance from the Project Manager for the use of any admixture or the use of ready mixed concrete, to pump concrete, or to use cement or cement blends other than ordinary Portland cement (OPC).
- Compaction of concrete is required to be done by means of mechanical vibrators only.
- The Contractor is required to submit the concrete mix design to the Project Manager for acceptance.
- The Contractor is required to demonstrate, by means of a report from an approved laboratory, that the aggregates do not exhibit excessive shrinking properties in accordance with SANS 1083 and is also required to demonstrate that the aggregates do not have a potential alkali silica reaction.
- The Contractor is required to perform a slump test on the same batch of concrete every time a sample is taken, and the result recorded.
- Sampling of concrete test cubes and slump tests shall take place at the point of deposition.
- All exposed corners to be chamfered 20x20mm. Jointing design and material are suitable for the generally high/low temperature conditions on site, to minimize shrinkage and joint failure.

The Table 5 below indicates particular specifications pertaining to SANS 2001-CC1 and must be read in conjunction with the code:

Table 5: Concrete Specification

Clause	Particular Specification
3.5	**Concrete – Strength characteristics**
3.4.3	Concrete Grade is required to be: • Class 15 Mpa/ 19 mm for Blinding Concrete (28 days), • Class 20 -25 Mpa/ 19 mm for Structural Concrete (28 days).
4.2	**Materials**
4.2.7	In general, one of the following types of non-shrink grout are required to be used: • Cement-based non-shrink grout, not less than 50 Mpa;

Clause	Particular Specification
	• Special proprietary non-shrink or expansive grout, not less than 50 Mpa.
4.4	**Reinforcement**
4.4	Add the following: All reinforcement is stamped with a SANS quality assurance mark
4.4.3.1	Cast in-situ concrete cover is required to be a minimum of: • 50 mm for all faces
4.7	**Quality of Concrete**
4.7.1.1	• *Contractor* submits to the *Supervisor* full details and samples of all materials which he proposes to use for making concrete at least 28 days before the concreting of the *works* is due to commence.
4.7.10	Add the following: • A layer of blinding concrete of 50 mm minimum thickness is required to be placed under foundations. • A polyethylene sheet with a minimum thickness of 250 microns is required under ground slabs
4.7.12.2.3	• All angled corners are chamfered 20 mm x 20 mm, unless such other larger size is detailed on the Drawings.
4.7.19.3	• *Contractor* submits a detailed procedure for acceptance by the *Supervisor* on how he intends to carry out the repairs of structural concrete defects
4.7.22	• For concrete pour records, the *Contractor* submits a detailed Quality Control Plan to the *Supervisor* for acceptance. • In addition, the *Contractor* supplies the *Supervisor* with two copies of these records each day covering *works* carried out the preceding day.
5.1	**Testing**
5.1.1.4	All tests are to be done in accordance with SANS 2001-CC1 Clause 5.1 read in conjunction with SANS 5862 • Six 150 mm cube samples taken from each batch or place of concrete deposition, three cubes are tested at 7 days and three at 28 days.

Clause	Particular Specification
	• Strength at 7 days is required to be at least two thirds of 28 day strength.
5.1.2.1	• Any of the cube samples tested indicating a result more than 3 Mpa below the specified strength is disregarded.
5.2	**Tolerances**
5.2.1	• Tolerances on all concrete work is required to be a level II degree of accuracy as specified in SANS 2001-CC1 with and is to be carefully maintained throughout the construction.

Where applicable, the contractor shall submit to the Employer within 14 days of contract award, a proposed mix design for concrete, based on laboratory testing with details, specification, test results and mining licences where applicable for materials intended for use on the contract within the above parameters and the relevant SABS requirements, for approval by the Employer

Concrete may be produced from an onsite batching plant or, if available, from local ready-mix plant. Provision for separate mix designs covering ready mixed, site batched or pumped concrete mixes for strength concrete will be required, where applicable. Site batching of strength concrete will only be considered for approval following the submission by the Contractor of a detailed methodology which will include the handling and storage of materials, site mix control measures, batching capacity and redundancy supervision, conveyance of mixed concrete, and management of waste.

The use of admixtures is permitted but shall be subject to the approval by the Employer. The Contractor shall specify the target slump and expected slump range at delivery for the proposed mix design which should consider expected travel time from source to discharge point on site.

The Contractor shall submit a QCP, including hold points, for the placement, compaction, and curing of concrete to ensure high density, low permeability, durable concrete.

3.4.2 Structural Steel

All structural steel work is required to be in accordance with the latest edition of SANS 2001-CS1 and SANS 10162-1, SANS 1921-3 Strategy C and the relevant sections listed below:

- The Contractor is responsible for the stability of the entire structure and all structural elements during all the erection stages.
- All dimensions are required to be verified on site by the Contractor before any fabrication of steelwork commences.
- All welding is required to be conducted by coded welders. Supporting documentation is also required to be submitted to the Project Manager for acceptance. All welding is required to comply with AWS D1.1.
- The Contractor is required to supply all bolts, washers, nuts etc. for the structural steelwork.
- All steelwork and fencing mesh are required to be hot dipped galvanized.

- All galvanizing is required be done in accordance with SANS 121. Preparation of steel prior to galvanizing and coating thickness is also required to be in accordance with SANS 121.

Table 6 below indicates particular specifications pertaining to SANS 2001-CS1 and must be read in conjunction with the code:

Table 6: Structural Steel Specifications

Clause	Particular Specification
4.1	**Materials**
4.1.1	Add the following: • All structural steelwork is required to be grade S355JR
4.1.4.1	• Electrodes for electric welding are required to be E7018.
4.6	**Workmanship – Erection**
4.6.5	• On site welding is not permitted
5.3	**Non-destructive testing of welds**
5.3.3	• Fillet welds are required to undergo magnetic particle inspection (20 % of welds)
5.3.4	• All butt welds and full penetration welds are required to undergo ultrasonic non-destructive testing (100 % of welds)

3.4.3 Repair Mortars, Grout, and Crack fillers

The products listed in the list below includes names of different brands, this section is in no way an endorsement of any company or product and does not compel the appointed Contractor to use any of the listed brands. The products are listed for the purposes of identifying common industry products only. I

Upon appointment, the Contractor will be assumed to be competent and well experienced in structural repairs, such that he must be able to select the appropriate product for repairing the relevant defects. All products used must be endorsed by the Employers Engineers and be in line with the requirements of the repair. The aforementioned typical repair products are provided in the list below:

- Grouts
  - Sika 212 repair grout
  - Pro-Struct 531 MCI grout
- Repair Mortar
  - Sika Mono Top – 412NFG
  - Pro- Struct 528 VO- MCI

- Pro- Struct 513 Levelling Mortar

- Crack Repair and Concrete Coating
  - Spray-Lock SCP 743
  - Pro-Struct 528/529
  - Pros-Struct 618 LV
  - Sikagard 550w Elastic ZA
  - Spray-lock SCP 578
  - Vulkem 116 Joint Sealant

3.5 Setting Out

The appointed Contractor is responsible for all setting out and is responsible for conducting all additional surveys required for providing accurate works. The Contractor must ensure that all levels are maintained such that mechanical components are flush to the base surface, allow for ease of installation of all mechanical and electrical components, and maintain the levels of the relevant pipework or ducting.

Where gaps and/or discrepancies in information provided by the Employer are identified, the Contractor must inform the Employer, through the outage coordinator, within a reasonable time frame. No works will be permitted to continue in the affected section of the project area until the said gaps or discrepancies are agreed upon by the Contractor and Employer.

3.6 Temporary Works

In line with Clause 12 of the Construction regulations, the contractor shall be responsible for the design of all temporary works required to carry out the construction of the permanent works including but not limited to, temporary formwork, ramps, access and suspended platforms, scaffolding, ladders, and the like. The Contractor must, at the Employer's request or any other authorised inspector; timeously provide the temporary works design to the Employer or inspector. The submission must contain all drawing details, erecting instructions, method statements, risk assessments etc. These details must demonstrate compliance with the applicable SANS, ISO, and relevant Eurocodes.

The cost of all temporary works as well as the required design, drawings, certification, and additional safety inspections required on site to ensure compliance in this regard shall be deemed to be included in the Contractor's rates and overhead costs.

3.7 Storage of Plant, Materials and Equipment

All plant, material, and equipment required for the works will be procured, supplied, and installed by the appointed Contractor. Handling, transportation, storage, and installation shall be the responsibility of the Contractor. A site camp for the Contractor's personnel, plant, and equipment, will be identified and agreed upon by the Contractor and the Employer. The Contractor will oversee the site and take full responsibility of the site camp, as detailed in Section 3.8.2 below.

3.8 Site Facilities Required

3.8.1 Temporary Offices

The Contractor shall be required to provide their own offices equipped with the necessary telecommunications. The Employer will identify the position to be utilised and, where possible, provide services such as water and electricity. This shall remain the case unless stated otherwise by the Employer.

3.8.2 Site Camp, Assumption of Material Ownership

All material utilized while executing this scope will be supplied and delivered by the appointed Contractor to a designated site camp, within reasonable proximity to the project area. The Contractor will be responsible for the following activities from commencement to close out:

- Provision of security for the duration of the project (Day and Night), unless agreed otherwise with the Employer.
- Maintenance of firebreaks
- Maintenance of access roads within the site camp.
- Ensuring that when material is removed from the site camp, the remaining material is not disturbed, damaged, and remains properly stacked.

The Contractor shall remain responsible for the transportation, offloading, and the correct stacking of material, equipment, and plant upon delivery to the site camp. The Contractor shall, in addition, be responsible for the following tasks within the site camp during the validity period of the contract:

- The Contractor shall make available suitably qualified and experienced personnel to conduct an audit, together with the Employer's quality control representative, of all materials delivered to site.
- The Contractor shall repair defects, or replace damaged material, equipment, or plant at his expense to the satisfaction of the Employer. This includes all damages as a result of fire, theft, or vandalism.

3.8.3 Laboratory Facilities

No testing laboratory is required on site for use by the Employer. Where concrete is used, a set of 6 moulds and a slump cone and necessary labour for taking concrete samples is to be provided and maintained for the use of the Employer.

3.8.4 Sanitary Facilities

Unless stated otherwise by the Employer, the Contractor must provide his own lavatories, for the duration of this Contract, to service all his personnel on site. All latrines shall conform to the requirements of the Local Authority and the EMP. All sanitary fees and charges, if any, due under the Local Authority or State Health Regulations for bylaws shall be paid by the Contractor. Throughout the progress of the Contract, all latrines shall be maintained by the Contractor in a clean and sanitary condition to the satisfaction of the Employer.

3.8.5 Housing Facilities

The Contractor shall include in his pricing, the cost of accommodation for his key personnel. All general labour will be sourced in accordance with the Eskom labour requirements and the accommodation will be addressed accordingly.

3.9 Features Requiring Special Attention

3.9.1 Dealing with Water

The Contractor shall be responsible for dealing with all water during the execution of works from whatever source, and the cost of all de-watering unless otherwise itemised in the pricing, shall be deemed to be included in the tender price.

3.9.2 Dust Prevention

The creation of dust in the Contractor's working area shall be kept to a minimum, particularly when working in inhabited areas, and shall conform to the requirements of the EMP. The Contractor shall water, on a daily basis, the areas of the site, which are creating dust outside, particularly in the site camp, as ordered by the Employer.

The Contractor shall take all measures necessary to ensure the protection of his employees from dust generated from his activities and the those emanating from normal energy generation processes or undesirable events such as uncontrolled fly ash emanating from dumping or general plant defects.

3.9.3 Permits

The Contractor shall be responsible for obtaining all necessary permits to transport materials and plant to the respective site.

3.9.4 Facilities for Other Contractors

The Contractor shall make allowance for the presence of other Contractors (sub-contractors) on Site, which may involve, inter alia, the adaptation of his plan to fit in with work to be done by the other Contractors, as well as assuring other Contractor's access to the site.

3.9.5 Spoil Material

No indiscriminate spoiling of material or rubble will be allowed. All surplus or unsuitable material and rubble shall be disposed of at the nearest approved Municipal waste site, or alternatively upon specific approval spoiled, levelled and spread in designated areas as directed by the Employer.

3.9.6 Finishing and Tidying

Progressive and systematic finishing and tidying will form an essential part of this Contract. On no account may spoil, rubble, materials, equipment or unfinished operations be allowed to accumulate in such a manner as to unnecessarily impede the activities of others, and in the event of this occurring, the Employer shall have the right to withhold payment for as long as may be necessary in respect of the relevant Works in the area (s) concerned without thereby prejudicing the rights of others to institute claims against the Contractor on the grounds of unnecessary obstruction.

Finishing and tidying must not be deferred to the end of the Contract. All finishing and tidying shall be carried in accordance with the EMP and to the best advantage of the project as a whole and in the closest co-operation with other contractors and all environmental requirements.

3.9.7 As-Built Drawings

The provision of As-built drawings does not apply to a like for like application. Upon completion of the works, the Contractor must provide as built drawings for any new works, designed and constructed during the relevant outages. The drawings must be provided in the following formats:

- Two (2) sets of hard copies (Paper size A0) (Signed by a competent and registered person)
- Two (2) Sets of hard copies (Paper Size A2) (signed by a competent and registered person)
- All Drawings in PDF format, signed by a competent and registered person (Both A0 and A2 paper size).
- A file of DWG drawings, that match the hardcopies must be submitted.
- All Drawings must have the Eskom logo.

With the exception of signatures, DWG drawings must match the PDF and hardcopies discussed above. All coordinates to be in WGS84, Hartebeeshoek 94 format.

3.10 Eskom Standard Specifications

Refer to Section 2.2.1 of this scope of work.

3.10.1 Existing Information

Based on the age of the station and discrepancies in the storage of documents, the Employer has limited existing information that may be provided to the Contractor. Drawings, dating as far back as the 1970s, may be available and may be provided to the Contractor. The Contractor must note that there are gaps in the information provided and there is a high possibility that such information is no longer legible. It is therefore imperative for the Contractor to note that the provided documents will be for information purposes only. Provision must be made for additional inspections that might be required in his pricing.

Blind use of the documentation provided by the Employer, does not absolve the Contractor of any liability.

4. Contractor's Plan

In line with Clause 21 of the NEC 3 TSC, the appointed Contractor provides a Contractor's Plan indicating the start and end date of the service period. As discussed in Section 2.1.1 above, there shall be works that will commence during outages (MO and/or GO), it is therefore imperative for the appointed Contractor to ensure that the works are aligned with the Outage Plan.

5. Price List

Unless otherwise stated in the Pricing data in the main Contract or revised by the Employer, this scope shall be priced and assessed in line with Clause 11 of the Main Clause Option A – priced contract with price list in the NEC 3 Term Services Contract (TSC). In accordance with Clause 54.1 of the NEC 3 TSC Option A, information in the price list is ***"not"*** service information; where discrepancies in information is noted, the Contractor must inform the employer as soon as they become aware of the discrepancy.

Only completed items, which are without defects, are assessed for payment at each assessment date; no part payment is made if the item is not completed by the assessment date. Where the Contractor deems additional items are to be added at tender, or descriptions changed, the Contractor must amend the items and price accordingly.

The Employer will not pay for any items on the Price list that have not been done. By accepting this Contract, the Contractor is aware and accepts all conditions detailed in this Scope of Work and the Contract data.

6. Site Specific Information

6.1.1 General

Kriel Power Station is situated approximately halfway between Bethal and Ogies on the R545, being just over 30 km from each town and 10 km north-west of Kriel town. The information provided below dates as far back as the year 2008. All figures presented below should be considered historical data and the Contractor must familiarize himself with the prevailing conditions, at the time of appointment.

6.1.2 Climate

Kriel Power Station is situated in a summer rainfall area with an average annual precipitation of about 750-mm falling almost entirely during the months of October to April. The average rainfall per month generally exceeds 40 mm during this period, although drought periods do occur which can last for 20 days or longer. Drought periods occur most frequently during the months of October/November and March/April. January is statistically the highest rainfall month with an average monthly rainfall of about 130-mm. June has the lowest rainfall with an average monthly rainfall of about 7 mm.

Approximately 85% of the annual rainfall occurs in the summer months and heavy falls of 125 to 150 mm occasionally occur in a single day. The annual average number of thunderstorms is about 75. These storms are often violent with severe lightning and strong (but short-lived) gusty winds and are sometimes accompanied by hail. This region has among the highest hail frequencies in South Africa; about 4 to 7 occurrences (depending mainly on altitude) may be expected annually.

January is normally the hottest month with an average daily maximum temperature of 27°C with a mean daily temperature in winter being about 16°C. Winter average daily temperatures vary from 18,5°C maximum to -1°C minimum. The extreme temperatures recorded range from 34,7°C to minus 12,4°C for the period 1920 – 1984. (Source: Weather Bureau, Pretoria)

Winds are generally light to moderate except during thunderstorms. Generally, the prevailing wind directions are from the Northwest during the day and from the east at night. During daytime, the prevailing winds are from the north-western direction. During night-time, the prevailing winds are from the north-eastern direction. The highest recorded average wind speed is 17,6 km/hour. The average wind velocity over the year is 14, 5 km/hour.

6.1.3 Weather Data

a) Relative Humidity

Records for Bethal (2008 – 2009) The average relative humidity on an annual base is as follows:

- For 08:00 = 80%
- For 14:00 = 52%
- For 20:00 = 73%

b) Prevailing Winds

Records for Bethal (2008 – 2009) – Winds are mostly north-westerly except for February and March when they are easterly to south-easterly. The highest wind speeds are recorded from the south-east: on average 14km/h.

c) Other Climatic Factors

Records for Bethal (2008 – 2009) – Thunder occurs mostly from November to January with average of 35.7 days annually.

- Hail occurs mostly in December with average of 2.8 days annually.
- Fog occurs mostly in the winter months with an average of 19 days annually.
- Snow rarely occurs.
- Cloud coverage is highest in the summer months with annual average as follows:
  - 08:00 = 2.8/8
  - 14:00 = 3.8/8
  - 20:00 = 3.1/8
  - Evaporation for the area is in rage of 75mm to 190mm per month. The highest evaporation occurs in December, and the lowest in June.

Conditions might have changed since the 2008-2009 survey; it is the Contractor's duty to familiarize himself with the latest weather information from the Weather Bureau

6.1.4 Air Quality

The existing and potential sources of air pollution in Kriel area are the following:

- Kriel Power Station smoke-stack emissions
- Kriel Power Station dry dust (fly ash) handling plant
- Dust blow from the Eskom coal stock yard
- Dust blow from the roads in the area
- Seasonal dust blow caused by ploughing of farmlands, and dust blow off denuded fields.
- Dust blow from dried out exposed surfaces of the wet ash dam.

However, Eskom utilises the majority of the top surface of the ash dam as an evaporation pan for polluted water, which means that the exposed surface is constantly wet. The sides of the ash dam have generally been rehabilitated.

7. Acceptance

This document has been seen and accepted by:

Name	Designation
Sanele Msibi	Senior Civil Engineer
Neo Muthavhine	Auxiliary Engineering Manager
Rofhiwa Nelwamondo	Engineering Manager
Sibusiso Ngwenya	Civil Maintenance Manager
Justice Leswiswi	Outages Manager

8. Revisions

Date	Rev.	Compiler	Remarks
April 2025	0.1	S. B Msibi	Submitted for comments
May 2025	0.2	S.B Msibi	Addition of civil maintenance and painting scopes, and review
June 2025	1.0	S.B Msibi	Final document

9. Development Team

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

- S.B Msibi

10. Acknowledgements

N/A

ANNEXURE A: PRICELIST

OUTAGES- CVIL AND STRUCTURAL REPAIRS PRICELIST						
ITEM NO.	**REFERENCE**	**DESCRIPTION**	**UNIT**	**QTY**	**RATE**	**AMOUNT**
1	SANS 1200A	**SECTION 1: PRELIMINARY AND GENERAL**				
1.1	8.3.1	Contractual Requirements	Sum	1		
1.2	8.3.2	Site Establishment				
	8.3.2.2	Facilities for the Contractor				
1.2.1		a) Offices and storage facilities	Sum	1		
1.2.2		b) Accomodation	Sum	1		
1.2.3		c) Communications, water supply and electric power	Sum	1		
1.2.3		d) Ablution facilities	Sum	1		
1.2.4		e) Tools and equipment	Sum	1		
1.2.5		f) Dealing with water	Sum	1		
1.2.6		g) Laboratiries - (off site concrete testing facilities)	Sum	1		
1.3	8.3.3	Other fixed charge obligations	Sum	1		
1.4	8.3.4	Site De-establishment	Sum	1		
1.5		General Safety, Safety File, Monitoring and Review				
1.5.1		Medicals	Sum	1		

1.5.2		Health and Safety File	Sum	1		
1.5.3		Personal Protective Equipment	Sum	1		
1.6		Vehicle 1- Double Cab Bakkie	Monthly	60		
1.7		Vehicle 2 - 22 Seater Mini Bus	Monthly	60		
1.8		Vehicle 3 - Double Cab Mini truck	Monthly	60		
Section 1 Carried Forward						
Section 1 Brought Forward						
2		**SECTION 2: PROVISION OF RESOURCES**				
2.1		**Normal Worktime**				
2.1.1		Professional Structural Engineer	hour			
2.1.2		Site Supervisor	hour			
2.1.3		Safety Officer	hour			
2.1.4		Civil Technician/Site manager	hour			
2.1.5		Quality Controler	hour			
2.1.6		Artisan (Bricklayer / Builder)	hour			
2.1.7		Labourer	hour			
2.1.8		Artisan (Plumber)	hour			
2.1.9		Carpenters	hour			
2.1.10		Painters	hour			
2.1.11		Welders A class	hour			
2.1.12		Welders B class	hour			
2.1.13		Crane driver	hour			
2.1.14		Shutter hands - grade 1	hour			
2.1.15		Reinforcement hands - grade 1	hour			
2.1.16		Concrete hands - grade 1	hour			
		Painting supervisors x 2 No.				
		Painting QC inspector x 1 No.				

		Painters x 15 No.				
2.2		**Weekday overtime**				
2.2.1		Professional Structural Engineer	hour			
2.2.2		Site Supervisor	hour			
2.2.3		Safety Officer	hour			
2.2.4		Civil Technician/Site manager	hour			
2.2.5		Quality Controler	hour			
2.2.6		Artisan (Bricklayer / Builder)	hour			
2.2.7		Labourer	hour			
2.2.8		Artisan (Plumber)	hour			
2.2.9		Carpenters	hour			
2.2.10		Painters	hour			
2.2.11		Welders A class	hour			
2.2.12		Welders B class	hour			
2.2.13		Crane driver	hour			
2.2.14		Shutter hands - grade 1	hour			
2.2.15		Reinforcement hands - grade 1	hour			
2.2.16		Concrete hands - grade 1	hour			
		Painting supervisors x 2 No.				
		Painting QC inspector x 1 No.				
		Painters x 15 No.				
2.3		**Saturday Overtime**				
2.3.1		Professional Structural Engineer	hour			
2.3.2		Site Supervisor	hour			
2.3.3		Safety Officer	hour			
2.3.4		Civil Technician/Site manager	hour			

2.3.5		Quality Controler	hour			
2.3.6		Artisan (Bricklayer / Builder)	hour			
2.3.7		Labourer	hour			
2.3.8		Artisan (Plumber)	hour			
2.3.9		Carpenters	hour			
2.3.10		Painters	hour			
2.3.11		Welders A class	hour			
2.3.12		Welders B class	hour			
2.3.13		Crane driver	hour			
2.3.14		Shutter hands - grade 1				
2.3.15		Reinforcement hands - grade 1				
2.3.16		Concrete hands - grade 1				
		Painting supervisors x 2 No.				
		Painting QC inspector x 1 No.				
		Painters x 15 No.				
2.4		**Sunday and Public Holiday Overtime**				
2.4.1		Professional Structural Engineer	hour			
2.4.2		Site Supervisor	hour			
2.4.3		Safety Officer	hour			
2.4.4		Civil Technician/Site manager	hour			
2.4.5		Quality Controler	hour			
2.4.6		Artisan (Bricklayer / Builder)	hour			
2.4.7		Labourer	hour			
2.4.8		Artisan (Plumber)	hour			
2.4.9		Carpenters	hour			
2.4.10		Painters	hour			
2.4.11		Welders A class	hour			

2.4.12		Welders B class	hour			
2.4.13		Crane driver	hour			
2.4.14		Shutter hands - grade 1	hour			
2.4.15		Reinforcement hands - grade 1	hour			
2.4.16		Concrete hands - grade 1	hour			
		Painting supervisors x 2 No.				
		Painting QC inspector x 1 No.				
		Painters x 15 No.				
Section 2 Carried Forward						
Section 2 Brought Forward						
3		**SECTION 3: PROVISION OF EQUIPMENT**				
		Tendered rates to include all fuel costs for the equipment provided and, where applicable, the price must include the cost of calibration.				
3.1		Concrete Vibrator	No.	1		
3.2		Stumper/ Wacker	No.	1		
3.3		Flood Lights (Generator powered)	No.	2		
3.4		Concrete cutter	No.	1		
3.5		Core Drilling Machine (drills from 25mm-150mm holes)		1		

3.6		Ground Penetrating Radar Machine - Concrete scanning	No.	1		
3.7		Breaker (To allow for breaking of high strength concrete)	No.	2		
Section 3 Carried Forward						
Sub- Total						
15 % Contingencies						
Sub-Total + Contingencies						
15% VAT						
Total						

CIVIL MAINTENANCE PRICE LIST						
ITEM NO.	**REFERENCE**	**DESCRIPTION**	**UNIT**	**QTY**	**RATE**	**AMOUNT**
1	SANS 1200A	**SECTION 1: PRELIMINARY AND GENERAL**				
1.1	8.3.1	Contractual Requirements	Sum	1		
1.2	8.3.2	Site Establishment				
	8.3.2.2	Facilities for the Contractor				
1.2.1		a) Offices and storage facilities	Sum	1		
1.2.2		b) Accomodation	Sum	1		
1.2.3		c) Communications, water supply and electric power	Sum	1		
1.2.3		d) Ablution facilities	Sum	1		
1.2.4		e) Tools and equipment	Sum	1		
1.2.5		f) Dealing with water	Sum	1		
1.2.6		g) Plant	Sum	1		
1.3	8.3.3	Other fixed charge obligations	Sum	1		
1.4	8.3.4	Site De-establishment	Sum	1		
1.5		General Safety, Safety File, Monitoring and Review				
1.5.1		Medicals	Sum	1		
1.5.2		Health and Safety File	Sum	1		
1.5.3		Personal Protective Equipment	Sum	1		
1.6		Vehicle 1- Double Cab Bakkie	Monthly	60		

1.7		Vehicle 2 - 22 Seater Mini Bus	Monthly	60		
1.8		Vehicle 3 - Double Cab Mini truck	Monthly	60		
Section 1 Carried Forward						
Section 1 Brought Forward						
2		**SECTION 2: PROVISION OF RESOURCES**				
2.1		**Normal Worktime**				
2.1.1		Civil Site Supervisor	hour			
2.1.2		Safety Officer x 2 No.	hour			
2.1.3		Civil Technician/Site manager x1 No.	hour			
2.1.4		Artisan (Bricklayer / Builder)	hour			
2.1.5		Labourers	hour			
2.1.6		Artisan (Plumber)	hour			
2.1.7		Carpenters	hour			
2.1.8		Painters	hour			
2.1.9		Welders A class	hour			
2.1.10		Crane driver	hour			
2.1.11		Shutter hands - grade 1	hour			
2.1.12		Reinforcement hands - grade 1	hour			
2.1.13		Concrete hands - grade 1	hour			
		Heavy duty vehicle operators				
		a) Vaccum truck operator/driver	hour			
		b) Excavator operator	hour			
		c) TLB operator	hour			
		d) 10 tonne overhead crane operator	hour			
		c) HP Mechine operator	hour			
		d) Tipper truck operator/driver	hour			
2.1.14		Painting supervisors x 2 No.	hour			

2.1.15		Painting QC inspector x 1 No.	hour			
2.1.16		Painters x 25 No.	hour			
2.2		**Weekday overtime**				
2.2.1		Civil Site Supervisor	hour			
2.2.2		Safety Officer x 2No.	hour			
2.2.3		Civil Technician/Site manager	hour			
2.2.4		Artisan (Bricklayer / Builder)	hour			
2.2.5		Labourers	hour			
2.2.6		Artisan (Plumber)	hour			
2.2.7		Carpenters	hour			
2.2.8		Painters	hour			
2.2.9		Welders A class	hour			
2.2.10		Crane driver	hour			
2.2.11		Shutter hands - grade 1	hour			
2.2.12		Reinforcement hands - grade 1	hour			
2.2.13		Concrete hands - grade 1	hour			
2.2.14		Heavy duty vehicle operators				
		a) Vaccum truck operator/driver	hour			
		b) Excavator operator	hour			
		c) TLB operator	hour			
		d) 10 tonne overhead crane operator	hour			
		c) HP Mechine operator	hour			
		d) Tipper truck operator/driver	hour			
2.2.15		Painting supervisors	hour			
2.2.16		Painting QC inspector	hour			
2.2.17		Painters x 10 No.	hour			

2.3		**Saturday Overtime**				
2.3.1		Civil Site Supervisor	hour			
2.3.2		Safety Officer x 2No.	hour			
2.3.3		Civil Technician/Site manager	hour			
2.3.4		Artisan (Bricklayer / Builder)	hour			
2.3.5		Labourers	hour			
2.3.6		Artisan (Plumber)	hour			
2.3.7		Carpenters	hour			
2.3.8		Painters	hour			
2.3.9		Welders A class	hour			
2.3.10		Crane driver	hour			
2.3.11		Shutter hands - grade 1	hour			
2.3.12		Reinforcement hands - grade 1	hour			
2.3.13		Concrete hands - grade 1	hour			
2.3.14		Heavy duty vehicle operators				
		a) Vaccum truck operator/driver	hour			
		b) Excavator operator	hour			
		c) TLB operator	hour			
		d) 10 tonne overhead crane operator	hour			
		c) HP Mechine operator	hour			
		d) Tipper truck operator/driver	hour			
2.3.15		Painting supervisors	hour			
2.3.16		Painting QC inspector	hour			
2.3.17		Painters x 10 No.	hour			
2.4		**Sunday and Holiday Overtime**				
2.4.1		Civil Site Supervisor	hour			
2.4.2		Safety Officer x 2No.	hour			

2.4.3		Civil Technician/Site manager	hour			
2.4.4		Artisan (Bricklayer / Builder)	hour			
2.4.5		Labourers	hour			
2.4.6		Artisan (Plumber)	hour			
2.4.7		Carpenters	hour			
2.4.8		Painters	hour			
2.4.9		Welders A class	hour			
2.4.10		Crane driver	hour			
2.4.11		Shutter hands - grade 1	hour			
2.4.12		Reinforcement hands - grade 1	hour			
2.4.13		Concrete hands - grade 1	hour			
2.4.14		Heavy duty vehicle operators				
		a) Vaccum truck operator/driver	hour			
		b) Excavator operator	hour			
		c) TLB operator	hour			
		d) 10 tonne overhead crane operator	hour			
		c) HP Mechine operator	hour			
		d) Tipper truck operator/driver	hour			
2.4.14		Painting supervisors	hour			
2.4.15		Painting QC inspector	hour			
2.4.16		Painters x 10 No.	hour			
Section 2 Carried Forward						
Section 2 Brought Forward						
3		**SECTION 3: PROVISION OF EQUIPMENT** Tendered rates to include all fuel costs for the equipment provided				

3.1		Concrete mixer 400litres	No.	1		
3.2		TLB	No.	1		
3.3		Bobcat	No.	1		
3.4		1 ton Roller	No.	1		
3.5		Concrete Vibrator	No.	1		
3.6		Stumper/ Wacker	No.	2		
3.7		Flood Lights (Generator powered)	No.	5		
3.8		Tipper Truck 10m	No.	2		
3.9		Concrete cutter	No.	1		
3.10		Level Grader	No.	1		
3.11		Core Drilling Machine (drills from 25mm-150mm holes)	No.	2		
3.12		Ground Penetrating Radar Machine - Concrete scanning	No.	2		
3.13		Vacuum Truck	No.	1		

Section 3 Carried Forward						
Section 3 Brought Forward						
4		**SECTION 4: PROVISION OF MATERIAL** Supply and deliver of materials for road repairs.				
4.1		G7	m^3	1500		
4.2		G5	m^3	1500		
4.3		G2	m^3	1500		
4.4		19 mm stone	m^3	1500		
Section 4 Carried Forward						
Sub- Total						
15 % Contingencies						
Sub-Total + Contingencies						
15% VAT						
Total						