Eskom	Scope of Work	Hendrina Power Station

Title: **Hendrina Power Station Roads Repair Scope of Work**

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Content

1. Introduction

Hendrina Power Station

Ensuring the safety, functionality, and operational efficiency of Hendrina Power Station relies heavily on the condition of its internal road network. Annual visual inspections are a key part of our asset management strategy, providing early identification of areas requiring attention. Recent inspections have revealed significant deterioration in several sections of the internal roads. The issues observed include large potholes, surface cracks, water ponding, failure of the road base layer, and inadequate surface drainage systems. These problems not only compromise the safety of personnel and vehicles but also hinder the smooth operation of the power station.

The findings are detailed in the following report:

- 380-HEN-AABB-D00139-31: Roads and Rail Annual Visual Inspection Report 2024

Both reports highlight several road sections classified as Level 4 and Level 5 findings, indicating severe defects that require urgent remedial action. This Scope of Work (SOW) document has been developed to address all defects identified during the inspections and to restore the internal roads to a safe and serviceable condition. Given the varying degrees of deterioration, different repair methods will be applied based on the severity and type of damage. The repair project is structured into the following categories:

- Pothole and Patch repair
- Correction of road slope
- Reseal of the flexible pavement surfaces
- Recycling and rehabilitation of severely deteriorated roads
- Redesign and reconstruction of the coal truck road

2. Supporting Clauses

2.1 Scope

This document specifies the requirements for repairing the station roads at Hendrina Power Station. The repair methods will include targeted spot repairs, comprehensive resurfacing, and full road rehabilitation or reconstruction for severely damaged sections. The goal is to restore all station roads to a safe and efficient condition for ongoing operations.

2.1.1 Objectives/Purpose

The objective of this Scope of Work is to restore and improve the station road infrastructure at Hendrina Power Station to ensure safe, reliable, and efficient access for all personnel and vehicles.

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] SANS 3001 - Civil engineering test methods
[2] COLTO: Standard Specification for Road and Bridge work
[3] TMH9 (1992) Visual Assessment Manual for Flexible Pavements
[4] TMH12 (2000) Visual Assessment Manual for Unsealed Roads
[5] TRH3 (2007) Design and Construction of Surfacing Seals
[6] TRH16 (1991) Traffic Loading for Pavement and Rehabilitation Design
[7] TRH14 (1985) Guidelines for Road Construction Materials.
[8] TRH12 (1997) Flexible Pavement Rehabilitation Design.
[9] SANRAL Routine Road Maintenance Manual, 2014.
[10] SANS 1200 Series (General Civil Engineering Works).
[11] SANS 731-1:2015 (Road Marking Materials).
[12] SANS 1200-DB:1996 (Stormwater Drainage).
[13] SANS 1200-GC:1996 (Concrete (Structural)).
[14] South African Road Traffic Signs Manual (SARTSM).
[15] National Environmental Management Act 107 of 1998 and EIA Regulations 982–985 (2014).
[16] ISO 14001 Environmental Management Systems.

2.2.2 Informative

[1] 240-44682816 Provide Engineering During Construction
[2] 380-HEN-AABB-D00139-31 Hendrina Roads and Rail Visual Inspection Report
[3] 240-142483465: Guidelines on Maintenance and Rehabilitation of Roads
[4] 240-84418186: Roads Specification Manual

2.3 Definitions

2.3.1 Disclosure Classification

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

Words	Definitions
Flexible Pavement	A road structure that uses layers of materials (such as asphalt or bitumen) that flex under load, distributing stresses to the subgrade.
Rigid Pavement	Pavement constructed from concrete slabs that distribute loads over a wider area due to their rigidity.
Full-Depth Reclamation	Rehabilitation technique where existing pavement and base materials are pulverized, mixed (often with stabilizers), and reused to form a new base layer.

In-Situ Recycling	The process of rehabilitating pavement by milling and reusing existing materials on site, often with additives like legacy ash.
Hot-Mix Asphalt (HMA)	Asphalt mixture produced at high temperatures, used for durable pavement layers.
Cold-Mix Asphalt (CMA)	Asphalt mixture produced without heating, used for temporary or low-traffic repairs.
Emulsion Treated Base (ETB)	Base layer material stabilized with bituminous emulsion to improve strength and water resistance.
Cemented Legacy Ash (CLA)	A stabilized pavement layer incorporating legacy ash (a by-product from power station operations) and cement to enhance strength and sustainability.
Cape Seal	A surface treatment combining a chip seal with a slurry or micro-surfacing layer for improved durability.
Environmental Management System (EMS)	A framework for managing environmental responsibilities and compliance, often aligned with ISO 14001.
Permit to Work	An official authorization required before commencing specific work activities, particularly those with safety or environmental risks.

2.4 Abbreviations

Abbreviation	Explanation
ETB	Emulsion Treated Bases
BTB	Bitumen Treated Bases
BOQ	Bill of Quantities
SOW	Scope of Work
GPR	Ground Penetrating Radar

2.5 Roles and Responsibilities

Roles and responsibilities shall be defined in the contracting strategy and in terms of the contract placed between the parties.

2.6 Process for Monitoring

The engineering effort will be monitored via 240-53114190: Internal Audit Procedure. All project documents will be stored as per the ISO 9001 requirements and enforced by the Internal Audit Procedure as mentioned above.

2.7 Related/Supporting Documents

[1] 240-44682816 Provide Engineering During Construction

[2] 380-HEN-AABB-D00139-31 Hendrina Roads and Rail Visual Inspection Report

[3] 240-84418186 Roads Specification Manual

3. Scope of Work Definition

3.1 Underground Services Detection

The designated service provider shall perform a comprehensive underground utility detection survey utilising Ground Penetrating Radar (GPR) and other relevant techniques to facilitate road repair, rehabilitation, and reconstruction efforts. This aims to provide secure excavation and prevent harm to existing underlying infrastructure during construction. Identify and locate all existing underground utilities (e.g., water pipes, electrical cables, communication lines, stormwater conduits, sewer lines, etc.). All GPR data must be analysed by a competent and experienced specialist, such as an engineer, surveyor or an equivalent expert. Supply layout drawings/maps that depict the positions of all specified underground utilities overlying the current road configuration.

3.2 Traffic control

During road repair and reconstruction, the Contractor must adopt appropriate traffic control and management methods to protect staff, vehicles, and road users. The Contractor must submit a thorough Traffic Management Plan to the Eskom Engineer for approval before construction begins. The plan must incorporate temporary traffic flow, signage, lane closures or deviations, flagmen, pedestrian management (if needed), and work zone safety standards. For operational and safety reasons, full road closures are not allowed. Phased construction, temporary bypasses, or single lane alternating flow with flagmen must be used to accommodate traffic. The Contractor shall provide all signage, barriers, flag staff, and temporary traffic control equipment per the approved Traffic Management Plan and related road safety requirements (e.g. SARTSM). The Contractor shall inspect, maintain, and adjust traffic control measures to guarantee safety and effectiveness throughout the project.

3.3 Potholes Road Repair

All pothole and patch repairs must be executed in accordance with SANRAL's Routine Road Maintenance Manual (2014, Ch. 8) and TRH3: Design of Surfacing Seals (2007).

3.3.1 Isolated Pothole Repair

- Clean and trim potholes to a neat rectangular shape.
- Prime with diluted bituminous emulsion.
- Fill potholes using hot-mix asphalt (HMA).
- Escalate and treat any pothole exceeding standard limits of 300mm diameter and 100mm depth as a patch repair.

Estimated Areas Requiring Isolated Pothole Repairs:

- Access Road: 15 m²
- HV Yard Road: 10 m²
- Hendrina PS Road: 10 m²
- South Cooling Tower Rd 1 & Rd 2: 12 m²

- North Cooling Tower Rd 2 & Rd 3: 25 m²

Total Estimated Area: 75 m² (see section 6: appendices for locations)

3.3.2 Patch Repairs for Larger Potholes

- Mark and excavate the repair area, extending into sound pavement.
- Visually inspect the base or subbase and conduct DCP testing.
- Reconstruct the layers (Base/ subbase) with the G5 material and aim for a compaction of 98% MOD ASSHTO.
- Apply a 25-35 mm HMA wearing course to match and align with the existing pavement layer height.

Estimated Areas Requiring Patch Repairs:

- Access Road: 170 m²
- HV Yard Road: 200 m²
- Hendrina PS Road: 50 m²
- South Cooling Tower Rd 1 & Rd 2: 75 m²
- North Cooling Tower Rd 2 & Rd 3: 65 m²

Total Estimated Area: 560 m² (see section 6: appendices for locations)

3.3.3 Backfill and Treatment of Sinkhole on Flexible Pavement

- Mark and excavate the affected area; investigate for leaking services.
- Excavate to expose the existing pavement structure down to a competent and sound underlying layer. Thereafter, recompact the exposed layer to not less than 95% of Mod AASHTO maximum dry density. Reinstate the pavement layers as required to a compaction of 98% MOD AASHTO using the G5 material, and asphalt surfacing.
- The asphalt surfacing should be 25-35 mm HMA to match and align with the existing pavement layer height.

Location: North Cooling Tower Road 4 (90 m²)

3.3.4 Flexible Pavement Reseal

After pothole repairs, patch repairs and sinkhole treatment, do slurry seal on all the internal flexible pavement roads as per Sabita Manual 28/35 and TRH3 specification:

- Thoroughly clean the surface. Remove all dust, debris, oil patches, and loose material using brooms, blowers, or water jets.
- Seal cracks wider than 3 mm using appropriate crack sealing material.
- Use approved crusher sand, bitumen emulsion, and a filler (cement/lime).

- Use thick overlay (8-12mm) slurry type.
- The slurry mix design should comply with Sabita and COLTO specifications: typically, 14-20% emulsion by mass of dry aggregate, well-graded sand, and enough water to ensure workability.
- Edge protection: Mask off drains, kerbs, and adjacent surfaces. Overlaps at joints should be 25–150 mm, avoiding excessive overlaps or naked areas.
- Allow the slurry to cure and set typically, 4–8 hours under good weather before opening to traffic. Check for evenness, proper coverage, and absence of segregation; correct any deficiencies immediately.

Total Estimated Area: 6km x 7.5m = 45 000 m^2 (see section 6: appendices for locations)

3.4 Recycling and Rehabilitation of Flexible Pavement Road

Rehabilitation shall be performed in accordance with Eskom Road Specification Manual (240-84418186), TRH12: Flexible Pavement Rehabilitation Investigation and Design (1997), and SANS 1200-MJ:1996:

- Mill the current pavement to a depth of 75 mm and recycle in situ, combining it with 75 mm of legacy ash to form a new 150 mm stabilised base layer.
- The in-situ milled material will be regarded as G5 material.
- The legacy ash shall be collected at the designated ash dam site.
- Mix 75mm of milled in-situ material with 75mm of legacy ash to create a 50%: 50% blend of the stabilised base layer. The stabilised layer should adhere to a CLA3 formulation: 1340 kg of legacy ash, 1.8% to 3.4% Cement (OPC 42.5N), 0.75% to 1.35% Activator HC, and 330 litres of water.
- Compact the recycled base to at least 98% Modified AASHTO Maximum Dry Density, bearing strength (CBR) of 80 or more.
- Upon completion and curing of the layer, the contractor should conduct tests at the certified laboratory to ensure compliance with Mod AASHTO density and strength standards for a stabilised base layer.
- The contractor shall be responsible for the harvesting and transportation of the legacy ash to the site; the ash shall not be stockpiled but instead transported promptly for mixing/recycling to prevent environmental pollution.
- It should be noted that the first 2km of the carrying distance is the contractor’s responsibility.
- Apply a 35 mm HMA wearing course, ensuring proper temperature control during placement.
- Achieve a finished crossfall of 2–3% for drainage.

Estimated Areas Road Recycling:

- Unit 10 Road (1 875m^2)
- S Cooling tower Road 2 (925m^2)

- A portion of S Cooling Tower Roads 1 (1 450m^2)
- Stores & Maintenance Road 4 (425m^2)
- Stores & Maintenance Road 3 portion (906m^2)
- N cooling tower road 2 (2 020m^2)
- N cooling tower road 3 (830m^2)
- Sewage treatment plant road (12 000m^2)

Total Area for In-Situ Recycling: 20,431 m² (approx. 2.8 km)

3.5 Coal Truck Road Redesign and Reconstruction

Due to the change in coal delivery methods, the existing 1.65 km coal truck road must be redesigned and reconstructed to accommodate heavy-duty, high-volume traffic. Key points:

- Average Road width: 8.5 m; Length: 1.65 km.
- Traffic: 500 x 34-ton trucks/day.
- Special attention to underpass rail bridge and turning radii.
- Use sustainable construction practices and environmental controls.
- The new designed road must be a Category A Road as per TRH4.

3.5.1 Road Investigation and Design

- Conduct condition assessment per TMH9: Pavement Management Systems (1992).
- Perform geotechnical and traffic load analysis (ESALs).
- Survey and redesign horizontal and vertical alignment according to TRH4: Geometric Design of Rural Roads (1996).

3.5.2 Road Drainage

- Assess and redesign all surface and subsurface drainage in line with SANS 1200-DB: Stormwater Drainage (1996).
- Incorporate V-drains, concrete pipes and subsoil drainage as needed.

3.5.3 Pavement Structure

- Design using conventional methods, then modify subbase and base layers to include Cemented Legacy Ash (CLA) as per Eskom Road Specification Manual.
- The legacy ash shall be used only for the design and construction of road layers, specifically the subbase and base. The subbase and base layer design must comply with CLA3 composition as specified in the Eskom guideline.

- The use of legacy ash is explicitly forbidden in the wearing course or final asphalt layer. The wearing course of this new road design should consist of a flexible pavement classified as Category A to support heavy traffic flow.
- Ensure all materials and construction methods meet SANS 1200-MJ:1996 and TRH14: Guidelines for Road Construction Materials (1985).

3.5.4 Detailed Design Report

The Contractor shall prepare and submit all detailed design documentation, including drawings, specifications, calculations, material data sheets, and construction method statements, for review, comment, and approval by Eskom prior to commencement of construction activities.

3.6 Rigid (Concrete) Pavement Repairs

Repairs to rigid (concrete) pavements must be performed in accordance with the procedures outlined in the SANRAL Routine Road Maintenance Manual (Chapter 9) and SANS 1200-GC:1996 (Concrete, Structural). Repair Methodology for Loose/Spalled Concrete:

- Remove all loose material, including adjacent cracked concrete likely to fail.
- Clean the exposed concrete thoroughly using compressed air and wire brushes.
- Fill spalled areas with asphalt, ensuring the fill exceeds the required thickness by 40% to allow for optimal compaction.
- Apply a 20 mm concrete cover across the full length and width of the repaired pavement.
- Where adhesion between asphalt and concrete is problematic, treat the concrete with an Epoxy-based bonding agents for concrete, such as Sikadur epoxy adhesives, allow it to cure, and then apply a tack coat of modified emulsion before the asphalt is placed.

Location: Coal Staithe Road (5,500 m²)

3.7 Flexible Pavement Surface Material Specifications

Asphalt surfacing and patching to follow SANRAL Routine Road Maintenance Manual (2014, Ch. 7).

On-site hot asphalt mixing for small patches:

- Use 9.5 mm and 6.7 mm surfacing stone, crusher sand, and 60% stable-mix emulsion.
- Bitumen emulsion to contain 4–5% net rubber.
- Mixing, temperature control, and compaction must meet SANS 1200-MJ:1996 standards.

3.8 Use of Legacy Ash in Construction

Legacy ash shall be used as a construction material for base and subbase layers, particularly in recycling and new construction works. The contractor is responsible for:

- Conducting laboratory tests to determine the optimal blend of legacy ash and gravel/soil to achieve compaction and strength requirements.
- Ensuring all use of legacy ash complies with Eskom Road Specification Manual (240-84418186) and environmental guidelines.

3.9 Reinstating of Stormwater Drains

The contractor shall install new stormwater drains (v-drains) and/or adjust road slopes to ensure effective drainage and direct runoff to the nearest manhole. All works must comply with SANS 1200-DB:1996 (Stormwater Drainage) and relevant municipal standards. Key Requirements:

- The exact locations for drain upgrades will be indicated on site by the Engineer.
- All new stormwater drains must be connected to the existing stormwater network via the nearest available manhole.
- The contractor must submit detailed proposals for all tie-ins to the Station Engineer for approval and for the development of works instructions.
- All installations must ensure free fall of water and prevent ponding or erosion.

The following roads require the installation of new stormwater drains (v-drains) or the improvement of the road slope to allow free fall of water to the nearest manhole:

- Unit 10 Road (265m)
- North Cooling Tower, T-junction (140m)
- Coal Staithe Road (500m)

3.10 Reinstating of Road Markings

All road markings must be reinstated in accordance with SANS 731-1:2015 (Road Marking Materials) and the South African Road Traffic Signs Manual (SARTSM).

- Scope: 6km km in length, average width 7.5 m.
- Road markings must match the original layout and comply with visibility, reflectivity, and durability standards.
- Only approved materials and application methods are to be used.

3.11 Housekeeping

- Remove all unused materials, rubble, and waste from the site to an Eskom-licensed disposal facility.
- Maintain a clean and orderly work environment throughout the project duration.
- The final payment will be contingent upon a satisfactory housekeeping check, as verified by the designated area's check sheet.

Note: All quantities provided are for tendering purposes only. Payments will be based on actual measured quantities. The contractor is responsible for verifying all measurements and must provide a complete set of product specifications and method statements for approval prior to commencement.

4. SHEQR requirements

All work must be executed in strict accordance with Hendrina Power Station's safety, health, environmental, quality, and risk (SHEQR) protocols, as well as applicable South African legislation:

- Comply with all plant procedures and safety regulations.
- Complete Hendrina Power Station induction before starting work.
- Secure all necessary permits to work before commencement.
- Maintain a worker's register and conduct daily risk assessments.
- Obtain all required environmental authorisations in line with the National Environmental Management Act 107 of 1998 and EIA Regulations 982–985 (2014).
- Adhere to Eskom's environmental procedures to prevent pollution.
- Submit an environmental management system (EMS) file in accordance with ISO 14001.
- The last payment will only be processed after successful completion of the final housekeeping inspection.

5. Quality Management

- The contractor is responsible for preparing all Quality Control Plan (QCP) documentation, which must be approved by Engineering and the Quality Department before work begins.
- All work must adhere to Eskom's QM 58 quality requirements.
- The number of Non-Conformance Reports (NCRs) issued may influence eligibility for future tenders.
- The QCP must be progressively signed by the Engineer/Supervisor, Eskom QC Inspector, Contractor QC Inspector, and/or Approved Inspection Authority (AIA).
- No work may proceed without scopes approved by the Quality Department.
- The contractor is subject to quality audits at any stage during project execution.

6. Appendices / Annexures

Figure 2: Station Roads Layout

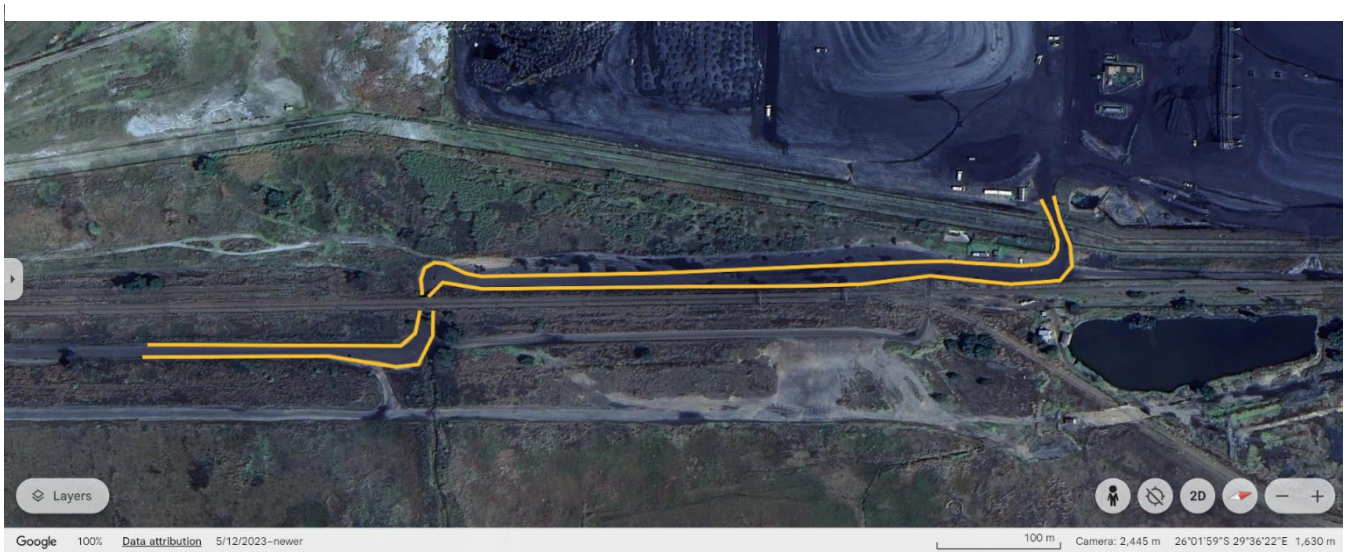

Figure 1: Coal Truck Road Layout

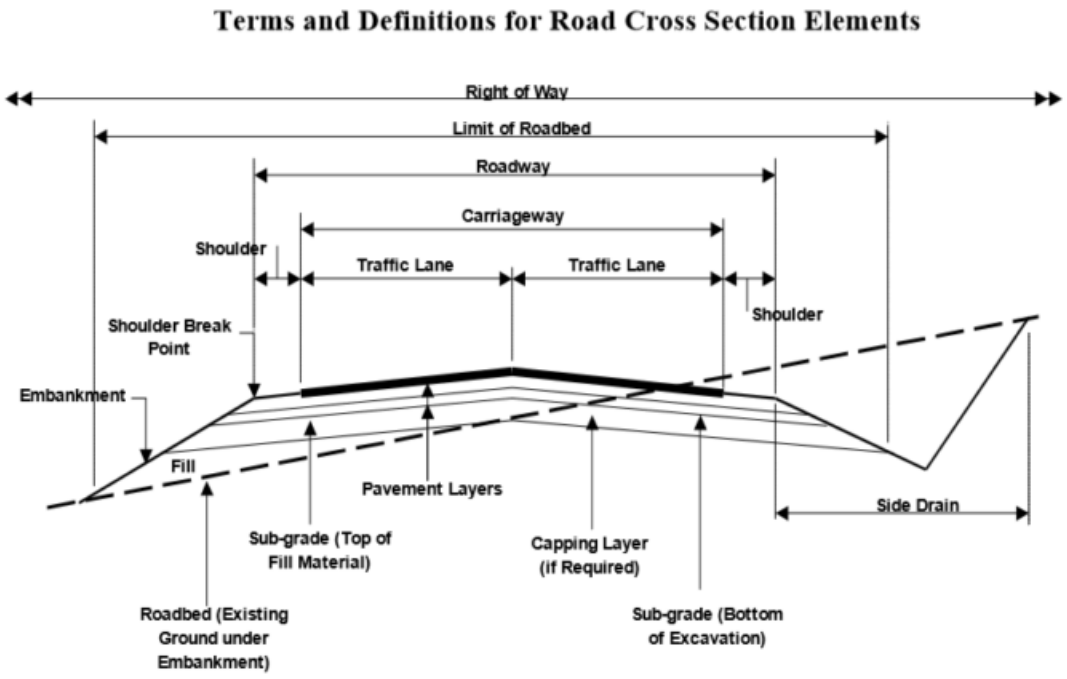

Figure 3: Typical Flexible Pavement Cross-Section

7. Acceptance

This document has been seen and accepted by:

Name	Designation
Sthembelenkosini Mthethwa	Civil Engineer
Ogorogile Ngwenya	Civil Engineering Manager
Lomile Ngqendesha	Engineering Manager
Riaan Venter	Chief Civil Engineer (PrEng)

8. Revisions

Date	Rev.	Compiler	Remarks
September 2025	0	Sthembelenkosini Mthethwa	Initial Document

9. Development Team

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

Sthembelenkosini Mthethwa

10. Acknowledgements

N/A

11. Bill of Quantities

Item	Description	Unit	QTY	Rate	Amount
A	**Preliminary & General Items**				
1	Site establishment	Sum	1		
2	SHEQR requirements	Sum	1		
3	Transport	Sum	1		
4	Tools & equipment	Sum	1		
5	Traffic Control (inclusive of all the items that form part of the traffic control management)	Sum	1		
5.1	Regrading, alignment correction and reinstatement of the existing temporary coal truck diversion road, including shaping, layer construction and compaction.	Sum	1		
6	Underground service detection and protection	Sum	1		
B	**Flexible Pavement Road Repair (Isolated Potholes, Patch Repair & Road Reconstruction)**				
1	Isolated Potholes	m^2	75		
2	Patch Repair	m^2	560		
3	Recycling & Rehabilitation of Flexible Pavement Roads	m^2	20 431		
4	Coal Truck Road Redesign and Reconstruction	m	1650		
C	**Reseal of flexible pavements**				
1	Pavement Reseal	m^3	540		
2	Treatment of Sinkhole on Flexible Pavement	m^2	90		

D	**Concrete Pavement Repair**				
1	Rigid Pavement	m^2	5500		
F	**Reinstatement of Drainage & Road Markings**				
1	Drainage repair	m	910		
2	Road Markings	m^2	45 000		
G	**Miscellaneous**				
	Site clean-up and demobilisation	Sum	1		