Klipspruit Colliery

Structural Assessment of CV06 N12 BRIDGE

Division of Seriti Power

STRUCTURAL INSPECTION AND MAINTENANCE MANAGEMENT

Service | Safety | People

Isithelo Mining Consultants and Services (Pty) Ltd
345 Rivonia Blvd, Rivonia, Johannesburg, South Africa
www.isithelo.com

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Klipspruit Colliery- Structural Assessment of CV06 N12 Bridge

Client
Klipspruit Colliery – A Division of Seriti Coal

Author(s)
AMasarira
……..
Alvin Masarira, PrEng, PhD
Principal Structural Engineer

Distribution List
External
Francois Coetzee (Seriti Engineering)
Mias Du Plessis (Seriti Engineering)
Shadrack Xulu (KNL)
Terry Scheepers (KNL)
Godfrey Nkabinde (KNL)
Neo Kokome (KNL)
Lourens Janse Van Rensburg (KNL)

Internal
Jose Prozzi
Thulare Bopape

EXECUTIVE SUMMARY

This report presents the results of a structural condition assessment conducted on the CV06 N12 Bridge at Klipspruit Colliery, a division of Seriti Coal. The inspection, performed on 14 May 2025 by Isithelo Mining Consultants and Services, aimed to evaluate the integrity, safety, and maintenance requirements of the bridge structure. The findings indicate that the overall structural condition of the bridge is satisfactory, with no critical defects observed. All elements inspected fell within Condition Category 2, indicating minor deterioration without significant loss of structural capacity. Recommendations primarily include continued periodic inspections and standard maintenance measures. No immediate remedial actions were deemed necessary, though a proactive maintenance approach is advised to mitigate future risks.

The bridge inspections should be conducted every 3 years by a professional structural engineer.

The next structural inspection by a professional engineer should be scheduled in the first half of 2028.

URGENT ITEMS

The urgency of the items is based on the risk rating, and if safety-critical findings and recommendations are mentioned, they require more urgent items.

LIMITATIONS

The report mainly focuses on the areas of concern identified. Where there are no visible concerns, the report does not make mention of those areas even though they were inspected.

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The client, by acting on this report, accepts these terms and conditions, indemnified and holds Isithelo, Mining Consultants and Services (Pty) Ltd harmless against all such loss or damage.

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1. INTRODUCTION

The CV06 N12 Bridge at Klipspruit Colliery was inspected on 14 May 2025 by Rifumu Mabasa and Alvin Masarira of Isithelo Technical Solutions. The purpose of the inspection was to evaluate the structural integrity of the bridge and identify any elements requiring maintenance or repair to ensure continued operational safety. The inspection was a visual assessment of the bridge's superstructure and substructure elements, including beam girders, pier caps, deck surfaces, and steel frameworks. Each component was classified based on a six-tiered structural condition rating and prioritized according to associated safety and operational risks.

2. GENERAL

2.1 STRUCTURAL CONDITION CATEGORIES

Six condition categories are used throughout this report to define the condition of plant structures. These are described in Table 2-1 below.

Table 2-1: Condition categories

Category	Description	% Original Strength	Typical Remedial Action
0	The plant structures are in excellent condition, with no deterioration evident. Safe use of the plant structures is assured.	100	None required
1	The plant structures have slight evidence of surface deterioration, but to an extent that there is no reduction in strength. Safe use of the plant structures is assured.	100	None required
2	The plant structures have some deterioration, to an extent that there is slight reduction in strength. Safe use of the plant structures is assured.	95 – 100	Repaint, tighten bolts, other minor work
3	The plant structures show deterioration, to an extent that there is some reduction in strength. There is some compromise to safe use of the plant structures. Repair must receive attention in maintenance scheduling.	75 – 95	Repaint, tighten bolts, other minor work
4	The plant structures 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 replacement of members
5	The plant structures 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 members required urgently

Table 2-2: Levels of Priority

Priority	Description
1	All members in condition category 5, any primary structural members in condition category 4, and any other members where the deterioration leads to a risk to personnel safety must be recorded as Priority 1. Repair or replacement of the structural members, or other recommended work, requires urgent, immediate attention.
2	All secondary or tertiary members in condition category 4, and any other structural members requiring repair or replacement in the short term must be recorded as Priority 2. Repair or replacement of the structural members, or other recommended work, should be scheduled as soon as possible, but not later than one year from date of this report.
3	Repair of the structural members, or other recommended work, will be required within the next three years.
M	Where some aspect of a structure must be specifically monitored to ascertain the rate of ongoing deterioration, this may be recorded as Priority M. This might apply for example, where loose bolts are encountered and it is not clear why they are loose, or whether are repeatedly loosening. It might also apply for example, where cracks are detected and the Structural Engineer finds it necessary to identify the rate of growth of the cracks.
X	Where a structure or portion of a structure cannot be used for its intended purpose in its current condition, but may not be required to be used for some time, it must be recorded as Priority X. This would typically apply to maintenance structures such as crawl beams. Repair or replacement of the structural members must be completed before use of the structure.

Table 2-2 describes the levels of priority (i.e., degree of urgency) in the implementation of the remedial action recommended.

Table 2-3 provides a risk rating matrix (5 X 5) - Structural Condition and Risk to Production for the structures reported on.

Table 2-4 provides the likelihood of occurrence (probability) and safety, health and environmental severity

Table 2-5 provides a risk evaluation.

Table 2-3: Structural Risk Rating (Structural Condition and Production Criticality)

		Structural Condition and Production Criticality					
Loss type		**0 None**	**1 Insignificant**	**2 Minor**	**3 Moderate**	**4 Major**	**5 Catastrophic**
Production		None	Minor disruption to production, less than 1 day loss or <0.5% loss in annual production	Minor disruption to production, less than 3 days loss or 0.5% -1% loss in annual production.	Partial shutdown, between 3 – 7 days loss or 1% - 2% loss in annual production	Partial loss of operation, 1-3 weeks loss or 2% - 6% loss in annual production	Substantial loss of operation, more than 3 weeks loss or > 6% loss in annual production
Structural Condition		**Risk Rating**					
Very Severe	**5**	0	**11**	**16**	**20**	**23**	**25**
Severe	**4**	0	**7**	**12**	**17**	**21**	**24**
Moderate Deterioration	**3**	0	**4**	**8**	**13**	**18**	**22**
Minor Deterioration	**2**	0	**2**	**5**	**9**	**14**	**19**
Good	**1**	0	**1**	**3**	**6**	**10**	**15**
Excellent	**0**	0	**0**	**0**	**0**	**0**	**0**

Table 2-4: Likelihood of Occurrence and Consequences

	Safety, Health and Environmental Severity/Consequence					
		1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
Safety	Level of Condition Deterioration ↓	First Aid Treatment Medical Treatment Injury	Lost Time Injury 1-13 Days (Reversible injury) RWI – Restricted Work Injury	Lost Time Injury >13 Days (Moderate irreversible injury)	Single fatality (permanent disability to one or more persons)	Multiple fatalities
Health		Irritation, nuisance, no medical treatment, inconvenience	Medium term largely reversible health effect (Recovery in less than 5 days)	Moderate reversible health effect (Recovery in more than 5 days)	Irreversible human health effect to one or more individuals	Significant irreversible human health effect to 10's of people
Environment		An incident that can cause negligible reversible environmental impact requiring very minor or no remediation	An incident that can cause minor reversible environmental impact requiring minor remediation	An incident that can cause moderate, reversible environmental impact with short term effect requiring moderate remediation	An incident that can cause serious environmental impact with medium term effect requiring significant remediation	Can cause disastrous environmental impact with long term effect requiring major remediation
Probability (Likelihood of Occurrence)						
>99%	**5**	**11**	**16**	**20**	**23**	**25**
>50% and <99%	**4**	**7**	**12**	**17**	**21**	**24**
>20% and <50%	**3**	**4**	**8**	**13**	**18**	**22**
>1% and <20%	**2**	**2**	**5**	**9**	**14**	**19**
1%	**1**	**1**	**3**	**6**	**10**	**15**

Table 2-5: Risk Evaluation

Risk Score	Risk Level		Acceptability of Risk	Recommended Actions
<5	**Low**		Acceptable	No additional risk control measures required. To continue to monitor to ensure risk do not escalate to higher level.
6-12	**Moderate**		Moderately Acceptable	Acceptable to carry out the work activity; however, task need to be reviewed to bring risk level to As Low As Reasonably Practicable. Interim control measures such as administrative controls can be implemented. Supervisory oversight required.
13-20	**Medium to High**		Cautiously decide on acceptability	Great caution must be taken in deciding whether the job can be carried out. Steps should be made as a matter of urgency to reduce the risk to at least medium risk level. Risk controls should not be overly dependent on personal protective equipment. Controls measures should focus on Elimination, substitution and engineering controls.
>20	**Very High**		Not Acceptable	Job must not be carried out until risk level is brought to at least medium risk level. Risk controls should not be overly dependent on personal protective equipment. Controls measures should focus on Elimination, substitution and engineering controls. Immediate Management intervention required to ensure risk being brought down to at least medium level before work can be commenced.

3. CV06 N12 BRIDGE STRUCTURE

Fig. 3.1: Exterior envelope of the walkway

Structural Defect / Inspection Finding:

The exterior cladding panels sheeting remains free from damage and corrosion.

Condition Category:	2	**Priority:**	**3**
Recommendation:		**Risk Rating:**	9

Regular inspection of the cladding panels is recommended to allow for the early identification of any potential damage.

Fig.3.2: Steel floor beam girders

Structural Defect / Inspection Finding:

The steel floor beam supporting the bridge deck is structurally sound, exhibiting no visible signs of distress, such as deformation, overstressing, or localized damage.

Condition Category:	2	**Priority:**	**3**
Recommendation:		**Risk Rating:**	9

Continue monitoring the beam girder's condition through scheduled inspections to ensure early detection of any deterioration.

Fig.3.3: Pier head/cap

Structural Defect / Inspection Finding:

The pier cap, functioning as the load transfer interface between the superstructure and substructure by distributing reactions from the bridge beams, is in satisfactory structural condition with no visible indications of material degradation, cracking, or distress.

Condition Category:	2	**Priority:**	**3**
Recommendation:		**Risk Rating:**	9

Maintain periodic visual inspections of the pier cap to monitor for any early signs of structural distress, such as cracking, spalling, or settlement.

Fig. 3.4: Pier cap

Structural Defect / Inspection Finding:

The pier cap, acting as a bearing area to support the bridge beams and distribute load evenly, remains in good condition with no sign of deterioration or damage observed.

Condition Category:	2	**Priority:**	**3**
Recommendation:		**Risk Rating:**	9

Maintain periodic visual inspections of the pier cap to monitor for any early signs of structural distress, such as cracking, spalling, or settlement.

Fig.3.5: Base of the concrete pier

Structural Defect / Inspection Finding:

The base of the concrete pier is structurally sound, showing no evidence of surface wear, cracking, spalling, or other forms of concrete deterioration. No signs of differential settlement were observed.

Condition Category:	2	**Priority:**	**3**
Recommendation:		**Risk Rating:**	9

Continue with routine inspections to ensure the base of the pier remains free from structural defects. Monitor for any future signs of distress or ground movement and ensure proper site drainage to prevent moisture accumulation around the pier foundation.

Fig.3.6: Pier cap

Structural Defect / Inspection Finding:

The pier cap, functioning as the load transfer interface between the superstructure and substructure by distributing reactions from the bridge beams, is in satisfactory structural condition with no visible indications of material degradation, cracking, or distress.

Condition Category:	2	**Priority:**	**2**
Recommendation:		**Risk Rating:**	9

Maintain periodic visual inspections of the pier cap to monitor for any early signs of structural distress, such as cracking, spalling, or settlement.

Fig.3.7: Pier cap

Structural Defect / Inspection Finding:

The pier cap, acting as a bearing area to support the bridge beams and distribute load evenly, remains in good condition with no sign of deterioration or damage observed.

Condition Category:	2	**Priority:**	**3**
Recommendation:		**Risk Rating:**	9

Continue to monitor the condition of the beam girder through scheduled inspections to ensure early detection of any potential deterioration.

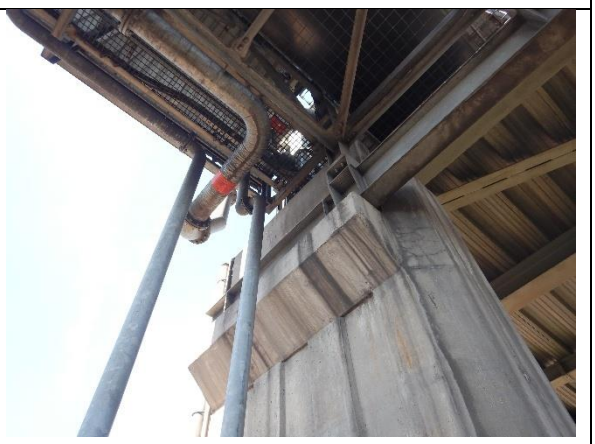

Fig.3.8: Bridge beams

Structural Defect / Inspection Finding:

The bridge beam girders supported by the pier head remain in good structural condition with no sign of overstressing or cracks observed.

Condition Category:	2	**Priority:**	**3**
Recommendation:		**Risk Rating:**	9

Continuous inspection of the bridge beams, anchorage assemblies, and elastomeric bearing pads to evaluate their integrity and performance.

Fig.3.9: Base of the concrete pier

Structural Defect / Inspection Finding:

The base of the concrete pier is structurally sound, showing no evidence of surface wear, cracking, spalling, or other forms of concrete deterioration. No signs of differential settlement were observed.

Condition Category:	2	**Priority:**	**3**
Recommendation:		**Risk Rating:**	9

Continue with routine inspections to ensure the base of the pier remains free from structural defects. Monitor for any future signs of distress or ground movement.

Fig. 3.10: Bridge support piers

Structural Defect / Inspection Finding:

The concrete piers supporting the bridge remain in good condition, with just minor surface staining.

Condition Category:	2	**Priority:**	**3**
Recommendation:		**Risk Rating:**	9

Continue regular visual inspections of the piers to monitor the extent of surface staining. No immediate remedial action is required, but periodic assessment is advised to detect any potential signs of deterioration at an early stage.

Fig.3.11: Pier heads/caps

Structural Defect / Inspection Finding:

The pier caps supporting the bridge beams remain in good condition with no sign of deterioration or damage observed.

Condition Category:	2	**Priority:**	**3**
Recommendation:		**Risk Rating:**	9

Maintain periodic visual inspections of the pier caps to monitor for any early signs of structural distress, such as cracking, spalling, or settlement.

Fig. 3.12: Piers

Structural Defect / Inspection Finding:

The piers supporting the beam girders of the bridge remain in good structural condition.

Condition Category:	2	**Priority:**	**3**
Recommendation:		**Risk Rating:**	9

Ongoing inspection of the bridge supporting structure.

Fig. 3.13: Piers

Structural Defect / Inspection Finding:

The piers supporting the beam girders of the bridge remain in good structural condition. just minor surface staining.

Condition Category:	2	**Priority:**	**3**
Recommendation:		**Risk Rating:**	9

Continue regular inspections of the piers to monitor the extent of surface staining. No immediate remedial action is required, but periodic assessment is recommended.

Fig. 3.14: Floor beams and cross bracing

Structural Defect / Inspection Finding:

The beams supporting the deck, including the longitudinal hollow circular sections, transverse I-section beams, and angular bracing elements, are in satisfactory condition with no visible signs of structural damage, cracking, corrosion, or material degradation.

Condition Category:	2	**Priority:**	**3**
Recommendation:		**Risk Rating:**	9

Maintain a routine inspection schedule for the steel structural members to monitor for any future signs of corrosion, fatigue, or connection loosening. Ensure protective coatings are intact, particularly at joints and exposed areas.

Fig. 3.15: Concrete pier cap

Structural Defect / Inspection Finding:

The pier cap/bearing seat supporting the steel beams is in stable condition, exhibiting no signs of distress, deformation, or material deterioration.

Condition Category:	2	**Priority:**	**3**
Recommendation:		**Risk Rating:**	9

Continue periodic inspections of the bearing seat to ensure it remains structurally sound and free from signs of wear, cracking, or displacement.

Fig.3.16: Base of the concrete pier

Structural Defect / Inspection Finding:

The base of the concrete pier is structurally sound, showing no evidence of surface wear, cracking, spalling, or other forms of concrete deterioration. No signs of settlement.

Condition Category:	2	**Priority:**	**3**
Recommendation:		**Risk Rating:**	9

Continue with routine inspections to ensure the base of the pier remains free from structural defects. Monitor for any future signs of distress or ground movement.

Fig. 3.17: Concrete pier cap

Structural Defect / Inspection Finding:

The pier cap/bearing seat supporting the steel beams is in stable condition, exhibiting no signs of distress, deformation, or material deterioration.

Condition Category:	2	**Priority:**	**3**
Recommendation:	**Risk Rating:**		9

Continue periodic inspections of the pier cap to ensure it remains structurally sound and free from signs of wear, cracking, or displacement.

Fig. 3.18: Concrete pier cap

Structural Defect / Inspection Finding:

The pier cap supporting the beams is in stable condition, exhibiting no signs of distress, deformation, or material deterioration.

Condition Category:	2	**Priority:**	**3**
Recommendation:	**Risk Rating:**		9

Continue periodic inspections of the pier cap to ensure it remains structurally sound and free from signs of wear, cracking, or displacement.

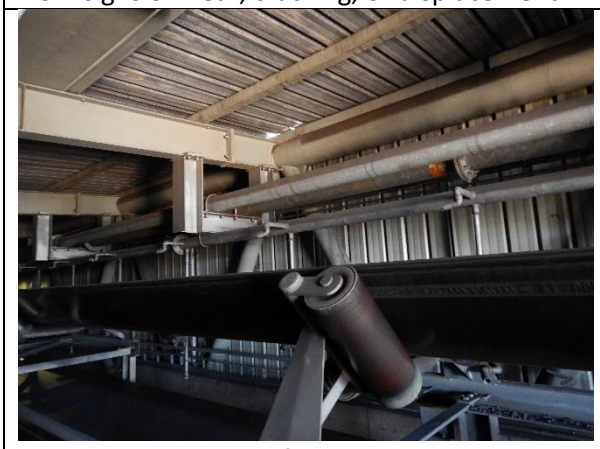

Fig. 3.19: Interior of the enclosed walkway structure

Structural Defect / Inspection Finding:

The roof steel framework is in good condition, with its structural integrity fully preserved and no observable signs of damage or degradation.

Condition Category:	2	**Priority:**	**3**
Recommendation:	**Risk Rating:**		9

Perform routine inspections of the structure to ensure continued structural integrity. Monitor for potential issues such as corrosion, loose connections, or deformation, particularly at joints and load-bearing points.

Fig. 3.20: Internal cladding sheets and side bracing assemblies

Structural Defect / Inspection Finding:

The sheeting is free from damage or corrosion. The bracing assembly remains intact.

Condition Category:	2	**Priority:**	**3**
Recommendation:	**Risk Rating:**		9

Maintain protective coatings to extend the lifespan of the structural elements.

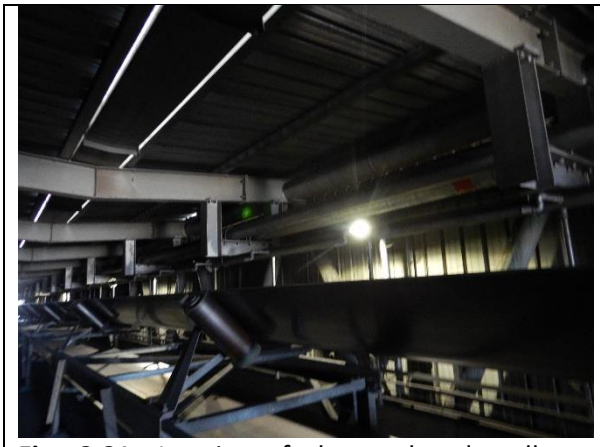

Fig. 3.21: Interior of the enclosed walkway structure

Structural Defect / Inspection Finding:

The roof steel framework is in good condition, with its structural integrity fully preserved and no observable signs of damage or degradation.

Condition Category:	2	**Priority:**	**3**
Recommendation:	**Risk Rating:**		9

Perform routine inspections of the structure to ensure continued structural integrity. Monitor for potential issues such as corrosion, loose

Fig. 3.22: Interior of the enclosed walkway structure

Structural Defect / Inspection Finding:

The roof steel framework is in good condition, with its structural integrity fully preserved and no observable signs of damage or degradation.

Condition Category:	2	**Priority:**	**3**
Recommendation:	**Risk Rating:**		9

Perform routine inspections of the structure to ensure continued structural integrity.

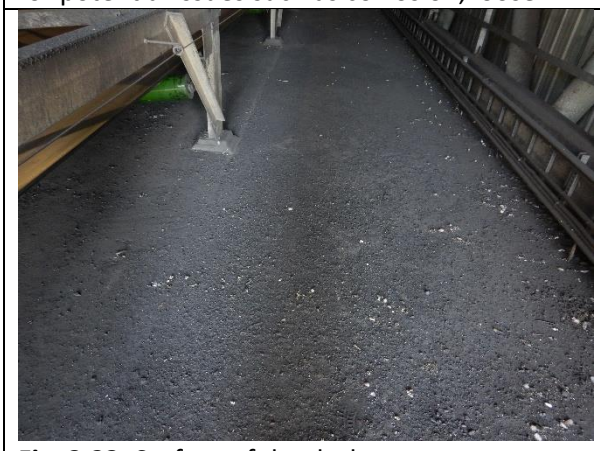

Fig. 3.23: Surface of the deck

Structural Defect / Inspection Finding:

The concrete deck remains in good condition with no sign of cracks or wear.

Condition Category:	2	**Priority:**	**3**
Recommendation:	**Risk Rating:**		9

Continue with regular inspections of the deck to monitor for any early signs of cracking, surface wear, or deterioration.

Fig. 3.24: Deck surface

Structural Defect / Inspection Finding:

The concrete deck remains in good condition with no sign of cracks or wear.

Condition Category:	2	**Priority:**	**3**
Recommendation:	**Risk Rating:**		9

Continue with regular inspections of the deck to monitor for any early signs of cracking, surface wear, or deterioration.

4. SUMMARY OF KEY FINDINGS

- All inspected components, including pier caps, bridge beams, floor girders, piers, cladding, and deck surfaces, indicate minor to no deterioration but no reduction in structural strength.
- No evidence of deformation, overstressing, material degradation, or cracking were observed on any major structural element.
- The Risk Rating for all inspected elements places them in the Minor to Moderate Risk category.
- All findings are not critical, implying that the repairs or inspections required should not be scheduled for immediate intervention.
- Only minor issues, such as surface staining, corrosion potential, and wear at joints and cladding panels, were observed, none of which compromise the bridge's immediate functionality.

5. SUMMARY OF KEY RECOMMENDATIONS

- Routine inspections should be continued, particularly focused on:
    - Pier caps and bearing seats for early signs of cracking, spalling, or displacement.
    - Steel elements and joints for potential corrosion or loosening.
    - Concrete elements for cracks or differential settlement.
- Maintenance of protective coatings is recommended, especially on steel frameworks and cladding panels, to prevent future corrosion.
- Monitoring of surface staining on concrete piers to ensure it remains superficial and does not indicate deeper material degradation.
- No structural modifications or replacements are currently required, but any future remedial work (if deterioration progresses) must be approved by a competent Structural Engineer, in accordance with SIMM guidelines.
- The bridge inspections should be conducted every 3 years by a professional structural engineer.
- **The next structural inspection by a professional engineer should be scheduled in the first half of 2028.**

APPENDIX A. GENERIC REMEDIAL WORK

1.1 GENERAL

An important aspect of the maintenance of any older building structure is repairing or replacement of damaged structural elements. This requires that due care is exercised, because structural integrity is critical to the safety of people and equipment in every building, and generally structures do not have redundant elements. Engineering Visual Structural Inspection Reports must always clearly specify what remedial work is required.

1.2 RECOMMENDATION FOR REMEDIAL WORK

Within the scope of a SIMM Inspection, recommendations will identify where structural members should be cleaned and repainted, repaired, or replaced. However, schemes for repair or replacement will generally not be provided. It is anticipated that the Client will place a further order for the Structural Engineering work required to specify the design and procedures for remedial work. However, there are certain general guidelines to be followed.

Removal or modification of structural elements can only be allowed under well-defined conditions. The most important condition is that in most cases it is necessary that any modification, repair, or replacement of a structural element must be specified and approved by a competent Structural Engineer. The following conditions apply to all remedial work recommended in SIMM reports:

a) All modifications should be specified by a competent Structural Engineer, but a concept may be proposed by the Plant personnel. All modifications must be approved by a competent Structural Engineer.
b) All repairs to damage in condition categories 4 and 5 should be specified by a competent Structural Engineer, but a concept may be proposed by the Plant personnel. All repairs to damage in condition categories 4 and 5 must be approved by a competent Structural Engineer.
c) Repairs to damage in condition categories 2 and 3 may be specified and carried out by the Plant personnel. Repairs to damage in condition categories 2 and 3 must be approved by the Plant Engineer.
d) Replacements may be carried out by the Plant personnel, provided the Plant Engineer approves the work and provided that all equipment, piping, flooring, tanks, etc supported by the structural element(s) to be replaced is first removed. In all other cases, the procedure for replacement of structural elements should be specified by a competent Structural Engineer, but a concept may be proposed by the Plant personnel. The procedure for replacement must be approved by a competent Structural Engineer.

1.3 REPAIRS

The repairs allowed under item 1.2 (c) above, include the following procedures:

1.3.1 INSTALLATION OF WELDED COVER PLATES ON CORRODED SECTIONS

Cover plates may be welded over members which have corroded to the extent of corrosion category 3, 4 or 5, provided the following conditions are all satisfied:

a) Corrosion occurs in limited local areas only, not extending for more than 0,5m along the length of the member.
b) No deformation of the structure, or any structural members, has occurred. Where any of these conditions is not satisfied, a Structural Engineer must approve the repair procedure.

The repair using cover plates must adhere to the following requirements

1. Cover plates must extend to at least 300 mm over sound steel, where the corrosion condition category is 2 or better.
2. Cover plates must be at least as thick as the original member.
3. Wherever possible cover plates must be welded all around, using fillet welds with a leg size of at least half the plate thickness.
4. Wherever possible cover plates should be used on both sides of the members being repaired.
5. The original/existing member must be cleaned of dust and dirt with careful use of a wire brush before welding to ensure a good quality weld.

It is also possible to weld a new angle on the inside of an existing corroded angle. All the requirements specified for repairs using cover plates must be adhered to. In addition to this, the following requirements must also be met:

a) The new angle must be sized such that cross-sectional area of the new angle is at least 90% of the original cross-sectional area of the existing angle.
b) The new angle must also be sized such that the leg length of the new angle will allow sufficient space to run a continuous fillet weld along the toe of the new angle. As a general consequence of this note and note (a) above, the new angle will have a shorter leg length but a greater thickness than the original angle.
c) The heel of the new angle must be ground down so that it sits flush inside the existing angle. In other words, the heel must accommodate the root radius of the existing angle.
d) Wherever possible, the new angle must be welded onto the existing angle all around, using fillet welds with a leg size of at least half the plate thickness.

1.3.2 BOLTS

Loose, damaged or missing bolts may be tightened or replaced by Plant personnel. The following precautions must be taken:

a) No more than one bolt shall be removed from one connection at a time. The bolt shall be removed, and replaced immediately by a new bolt, which shall be tightened properly before the next bolt is removed.
b) Where there are only two bolts in a connection, the load on the connection shall be minimised before the bolt is removed. To minimise the load, it is necessary to ensure

that bins are empty, floors are clear of stored material, equipment and people, and no more than a light wind is blowing.

1.3.3 REPAIR OF CUT-OUTS

Where cut-outs have been made in otherwise sound steel, they must be repaired using plate the same thickness as the steel member that has been cut. A piece of plate must be cut to fit into the cut-out, and must be prepared around its edges to allow it to be butt welded into position

1.3.4 REPAIR OF DAMAGED FLANGES

Note: This is not part of the SIMM guidelines but has been included to facilitate the repair work for the bent flanges noted in this report.

Where a flange has been bent, it should be bent back to its original position. The repair work should then be carried out in accordance with the procedures specified for the installation of welded cover plates on corroded members. In this case though, instead of the extent of the damaged area being identifiable by the corrosion, it will be equal to the extent of the localized bent area.

Isithelo Mining Consultants and Services

Service | Safety | People

Our focus is to provide specialist technical expertise and solutions to the mining industry. Previously the technical department of Anglo American's corporate office, the consulting team have combined their mining, project, geosciences, and technology expertise to form the entity Isithelo - Mining Products and Services.

From exploration to mine closure our areas of specialization include geosciences, project engineering and integration, safety and sustainability, mining, drilling and blasting, comprehensive engineering services and change management specific to improved operational performance.

Mining Explosives quality testing, REE and RBS, Initiation and accessories evaluation ,Incident investigation ,On Bench practices / assessment ,Borehole tracking, X,Y,Z mapping, Blast Optimization. Mine design, mine planning, fleet sizing, equipment scheduling. Equipment OPEX Costing.

Materials Handling Department Belt Condition Monitoring, Design Reviews, Discrete Element Modelling of Flow, Dust Management, Equipment Monitoring, Instrumentation, Flow Properties Testing, Mechanical Conveyor Design, System Audits. Equipment Selection and Concept Studies.

Industrial Engineering Dynamic simulation modelling (processes), capacity evaluation and optimisation, time and motion studies, facility layout planning, Lean Six Sigma DMAIC and DMADV, operations analysis, financial modelling, design of experiments.

Materials Engineering Failures Investigations, Remaining Life Assessment, Materials of construction selections, Welding Inspections, reviews and Designs, Coating selections and specifications, Mechanical Testing, Corrosion studies, On Site inspections and assessments, NDT testing

Mechanical Engineering Structural FEA (Static/Dynamic/Explicit), Multi Body Dynamics, Metal Fatigue Analysis, Test and Measurement, Investigations/Design Reviews, Tyre Pyrolysis and Fatality Investigations

Asset Management and Fluid Handling Complete Physical Asset Lifecycle management of mining equipment and process plans, Design and design reviews across the whole mineral processing value chain, Design and design reviews of fluid handling systems – water, slurry, compressed air, Flow simulations.

Structural Engineering Structural Condition Assessment SIMM, Failure Investigations, Structural Static/Dynamic Design/Analysis, Structural Risk Assessment and Profiling, Structural Feasibility Studies, Development of Repair Methodology, Training.

Mineral Residue Tailings Project Review FEL1 -FEL3; Oversight, Technical Assurance of Tailings Storage Facilities (TSF); Monitoring and Operational Control; Rehabilitation and Closure; Alignment with SANS 10286 best practice.

Quality Assurance Department ISO 9001 Implementation & Support, Project Quality (Stay In Business (Sib) & Capital Projects),Project QA (manufacturing & site),Supplier QA, Identify, Assess & Manage 3rd Party Inspection Companies, Technical Assessments on Suppliers, Training on auditing and site quality control

Geoscience Department Geological / Geophysical Consulting, employing advanced techniques of applied geophysics across the full mining value chain and in other industries.

Engineering | Quality | Geoscience | Mining | Minerals Residue

www.isithelo.com Tel: +27 11 772 1610

Directors: Jose Prozzi,

Company Registration Number: 2015/17148/07

Isithelo Mining Consultants and Services (Pty) Ltd

Queries : contact@isithelo.com

Contact : +27 10 880 6338

www.isithelo.com

KLIPSPRUIT COAL MINE

POLLUTION CONTROL DAMS 1

ANNUAL DAM SAFETY INSPECTION

Klipspruit Coal Mine
eMalahleni
Mpumalanga
South Africa

52W Circ Civil Eng Dam Insp EVN-X-C01A
52W Circ Civil Eng Dam Insp EVN-X-C01B

Isithelo Mining Consultants and Services (Pty) Ltd
Project Number: 4679

12 May 2025

Isithelo , Mining Consultants and Services (Pty) Ltd
19 Autumn Street, Rivonia 2128 , Johannesburg , South Africa
Reg : 2015/171486/07
VAT No.:4780271492
Postnet Suite #109 Private Bag 51 Rivonia 2128

Geoscience | Mining | Minerals Residue | Engineering | Quality Management

Isithelo Document No:
ITH4679-RPT-01

Date:
12 May 2025

Report Title:
POLLUTION CONTROL DAM 1 – ANNUAL DAM SAFETY INSPECTION
52W Circ Civil Eng Dam Insp EVN-X-C01A and C01B

Client:
Klipspruit Coal Mine

Distribution List
External:
Klipspruit Coal Mine

Internal:

Author(s):

AMasarira
.....
Neo Tamako (Civil Engineer)
Alvin Masarira (Principal Engineer)

Tel: +27 11 880 6338
Fax: +27 86 443 2984
Email: contact@isithelo.com
www.isithelo.com

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ACTION	FUNCTION	NAME	DATE	SIGNATURE
PREPARED	Civil Engineer	N Tamako	05.05.2025	
REVIEWED	Principal Civil Engineer	A Masarira	06.05.2025	
APPROVED	Director	J Prozzi	08.05.2025	

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1. CONTENTS

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1. INTRODUCTION

1.1 Purpose

Isithelo Mining Consultants and Services (Pty) Ltd (herein referred to as Isithelo) was commissioned by Klipspruit Colliery Pty Ltd (herein referred to as Klipspruit) to conduct an annual dam safety assessment for their dams. These dams are situated at their operational site near Ogies, situated within the Mpumalanga Province of South Africa.

1.2 Ownership

Klipspruit is an open-cast coal mine operated by Thabong Coal, a subsidiary of Seriti Resources, and produces approximately 8 million tonnes per annum (Mtpa) of Run-of-Mine (RoM) thermal coal. The mine is undergoing an expansion project known as the Weltevreden coal project, aimed at increasing the operational life of the colliery. Historically, Klipspruit was operated by South Africa Energy Coal (SAEC), a subsidiary of South 32, and before that by BHP Billiton Energy Coal South Africa, a division of BHP Billiton. The coal extracted at Klipspruit is classified as medium-rank bituminous thermal coal, suitable for beneficiation and export to European and Asian markets. Initially, coal was transported 34 km to the Rietspruit Wash Plant for processing and loading onto trains. However, this changed with the establishment of the Phola Coal Processing Plant. In December 2007, BHP Billiton and Anglo Coal formed a 50:50 joint venture to construct the Phola Coal Processing Plant on the Klipspruit site. The facility, with a design capacity of 16 Mtpa, processes RoM coal equally split between the two partners, thereby enabling the Klipspruit mine to reach its full 8 Mtpa production capacity. The Rietspruit washery was subsequently decommissioned in August 2009.

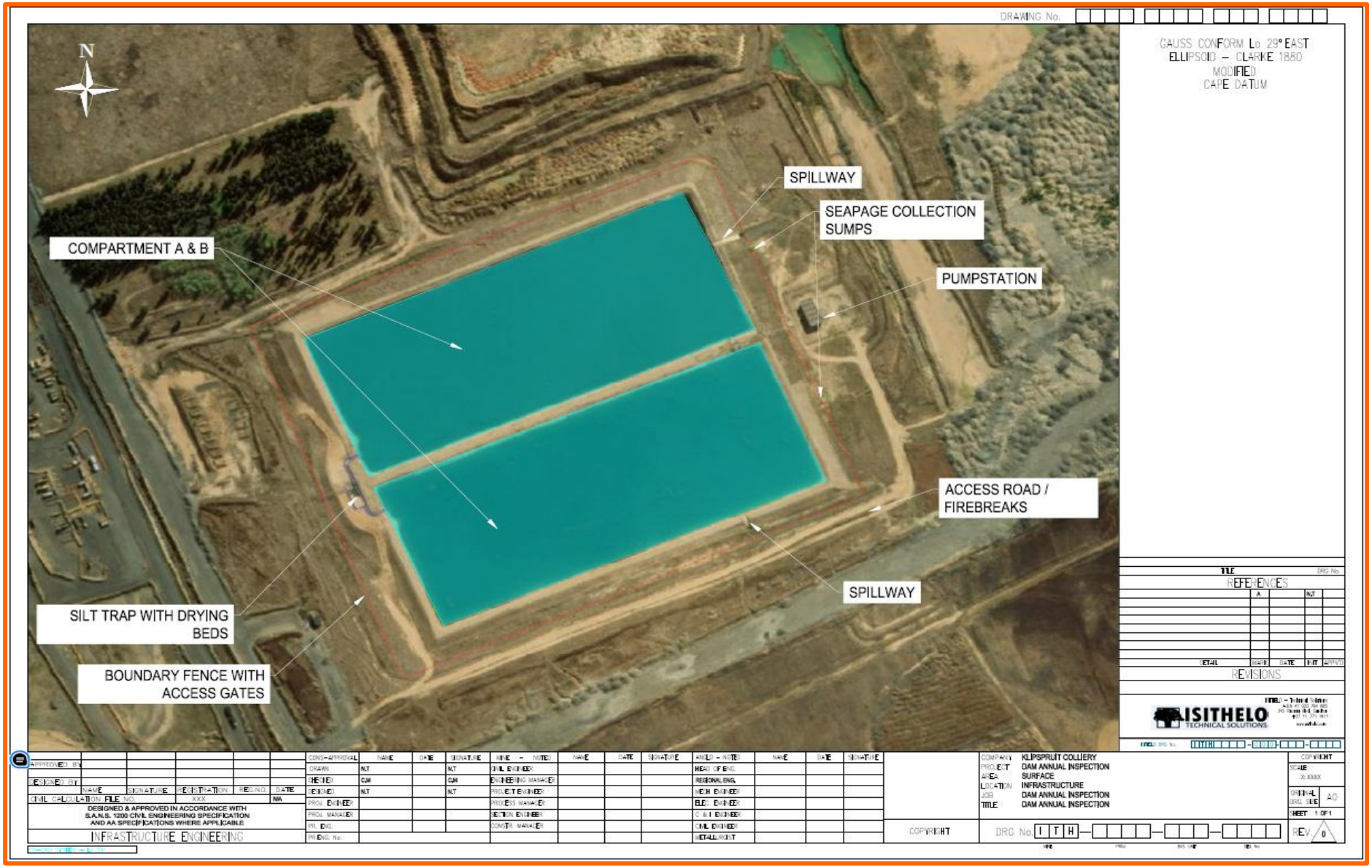
Export coal from Klipspruit is transported via Spoornet, a government-owned railway operator, to the Richards Bay Coal Terminal (RBCT), of which the mine's original operator was a part-owner. Following the commissioning of the Phola Plant, BHP anticipated 4 Mtpa of Klipspruit coal would be exported via RBCT. As of BHP's 2009 report, Klipspruit held an Old Order Mining Right, with a New Order Mining Right application submitted in 2004, pending processing at the time. The project had environmental approval from the Mpumalanga Department of Agriculture, Conservation and Environment since 2003. Initial mining commenced in August 2003 through truck-and-shovel contractor methods. In June 2021, Seriti Resources officially acquired South 32's shareholding in SAEC, thereby taking full operational control of Klipspruit.

1.3 Location

Klipspruit is located approximately 4 kilometres west of Ogies in Mpumalanga Province, within the Nkangala District Municipality and the eMalahleni Local Municipality. The facility is bordered by the R555 provincial road to the south, the R545 provincial road to the east, and the N12 national road to the north (Refer to). This report focuses on Pollution Control Dams 1 (EVN-X-C01A and C01B) (herein referred to as PCD 1), with its layout depicted in Figure 1-2.

Figure 1-1: Location of Klipspruit Coal Mine

Figure 1-2: Pollution Control dam 1 Layout



1.4 Dam Description

PCD 1 is designed to manage process water and stormwater runoff from the mine's open-cast coal operations. The dam is divided into two compartments, Compartment A and Compartment B, to enhance operational efficiency and maintenance. An inlet channel with a sluice gate regulates water flow, allowing each compartment to operate independently. This design enables one compartment to remain active while the other is cleaned or maintained, ensuring continuous water management. Table 1-1 provides a summary of PCD 1's characteristics based on measurements taken during the annual safety inspection.

Table 1-1: Dam Summary

Description	Value
Embankment type	Homogenous earth fill with a geofabric membrane
Maximum wall height	±5.5 m
Crest length	380 m
Crest width	5 m
Storage capacity at FSL	±660 000 m^3
Surface area at FSL	120 000 m^2
Lining parameters	Homogenous earth fill with a geofabric membrane (Sections of underlining HDPE liner noted)
Water source	N/A
Dam use	N/A
Upstream Slope	Inner slopes 1V:3H
Downstream Slope	Outer slopes 1V:2.2H Erosion protection: 75 mm topsoil and vegetation
Outlet pipe	Three (3) No. 100 mm diameter steel pipe
Drainage System	A concrete seepage detector structure along the downstream toe of each compartment, filled with 13 mm crushed stone and a 100 mm slotted drainpipe
Outflow Spillway	Concrete Lined trapezoidal overbank spillway

2. OBJECTIVE

An annual dam safety evaluation was carried out in terms of Dam Safety Regulation no 139 of the National Water Act, 1998. The main purpose of the annual dam inspection is to assess the present condition of the retaining water dam and confirm its current state and suitability for continued operations. This report provides the record of the observations following the dam safety inspection as well as recommendations on improving the present condition of the dam.

3. EXCLUSIONS

The following tasks will not be carried out and documented as part of the dam safety evaluation:

- Design adequacy review
- Construction defects
- Risk Assessments in relation to the operation of the dam

4. INFORMATION

4.1 Information Available

Prior to the inspection of PCD 1, no detailed information regarding the dam's design, construction, operational history, or previous inspections was available. Consequently, this report represents the initial dam safety assessment and serves as a critical baseline for evaluating the dam's condition, structural integrity, and compliance with Department of Water and Sanitation (DWS) regulations. Observations and measurements recorded during the inspection, as summarized in **Table 1-1**, form the primary basis for this assessment. Future inspections are recommended to build on this baseline and incorporate additional data, such as design specifications or operational records, if they become available.

4.2 Information Not Available

The following information was not available prior to the publication of the inspection report:

- Emergency Response plan and Emergency Preparedness plan;
- Maintenance records;
- Daily Inspection sheets. Klipspruit Colliery Mine (Pty) Ltd;
- Klipspruit Colliery Pollution Control Dam Design and Construction Report;
- Klipspruit Colliery Pollution Control Dam Operation and Maintenance Manual;
- Construction design drawings;
- Previous inspection reports; and
- Pollution Control Dam Annual Dam Safety Inspection Report.

5. DAM INSPECTION

A site inspection of the dam was undertaken on the 26TH of March 2025 by the following personnel:

- Alvin Masarira (Professional Civil Engineer);
- Rifumu Mabasa (Civil Engineer);
- Katlego Molefe (Civil Engineer); and
- Neo Tamako (Civil Engineer).

The weather at the time of the inspection was 24 degrees Celsius. The dam water level was visually noted to be 20% full. The various components of the dam were inspected, and relevant observations were made and documented in the subsequent pages of this report.

5.1 Wall Embankment

Table 5-1: Wall Embankment Condition

No.	Indicator	Comments
1	Wall type	Homogenous earth fill with a geofabric membrane
2	Wall crest condition	The crest requires minor grass removal
3	Visibility of erosion	Erosion gullies noted near the silt trap
4	Settlement	None observed
5	Seepage	None observed
6	Wall movement	None observed
7	Vegetation on wall (trees, shrubs)	Minor shrubs were observed on the crest of the dam
8	Holes (rats, ants, meerkats, moles, etc)	None observed
9	Grass condition	Minor grass cutting is required on the embankment
10	Alterations on wall	None observed
11	Photo reference	Photo 1 to Photo 4 in APPENDIX – Site inspection Photos

5.2 Dam Basin

Table 5-2: Dam Basin Condition

No.	Indicator	Comments
1	Dam basin	Reeds have been observed along the inner slope of the dam.
2	Rip rap condition	No concerns
3	Photo reference	Photo 5 and Photo 6 in APPENDIX – Site inspection Photos

5.3 Inlet

The inlet consists of three (3) steel 350mm Ø pipes that discharge water into the silt trap that directs the flow into the dam.

Table 5-3: Dam Inlet Condition

No.	Indicator	Comments
1	Pipe condition	No concerns
2	Water flow	Water quality report needs to be provided
3	Flow meter functionality	None observed
4	Photo reference	Photo 7 and Photo 8 in APPENDIX – Site inspection Photos

5.4 Outlet

The outlet works are located west of the dam. The outlet works include three (3) 100mm Ø steel pipes that are connected to a suction at the inlet.

Table 5-4: Dam Outlet Condition

No.	Indicator	Comments
1	Leakages	No leakages detected
2	Pipe condition	No concerns
3	Valve condition	No concerns
4	Downstream erosion	None observed
5	Photo reference	Photo 9 and Photo 10 in APPENDIX – Site inspection Photos

5.5 Spillway

Each compartment of the dam features an outflow spillway positioned along its side.

Table 5-5: Outflow Spillway Condition

No.	Indicator	Comments
1	Spillway type	Concrete
2	Erosion	None observed
3	Structure condition	No defects observed. The structure complies to GN704 legal requirements
4	Shrubs, trees, or reeds	None observed
5	Blockages	None observed
6	Water flowing	No water overflow observed
7	Rip rap condition	No concerns
8	Downstream channel condition	No concerns
9	Culverts	None observed
10	Photo reference	Photo 11 to Photo 14 in APPENDIX – Site inspection Photos

5.6 Safety and Security

Table 5-6: Safety and Security Condition

No.	Indicator	Comments
1	Fence condition	No concerns
2	Access roads	No concerns
3	Gate conditions	No concerns
4	Signage	No concerns

5	Safety buoys condition	No safety netting or floating buoys were observed during the inspection. This must be verified against the Seriti safety standard
6	Fire breaks	No concerns
7	Emergency contact numbers	No emergency contact numbers were observed
8	Emergency case	No emergency case observed
9	Photo reference	Photo 15 to Photo 18 in APPENDIX – Site inspection Photos

6. RECOMMENDATIONS

Table 6-1 provides the details the recommendations for the current site inspection completed by Isithelo on the 26th of March 2025.

Table 6-1: Updated recommendations

Description	Recommendations	Photo reference
Vegetation	Minor shrubs were observed on the inner slopes of the dam. Unwanted vegetation to be removed	Photo 2, 5, & 6
Safety nets	No safety netting or floating buoys were observed during the inspection. This must be verified against the Seriti safety standard	Photo 2, 5, & 6
Dam basin	Reeds were observed along the inner slope of the dam wall. Monitoring of the reeds and management is required	Photo 2, 5, & 6
Wall embankment	Erosion gullies were observed near the silt trap. The area needs to be ripped and recompacted	Photo 3
Sluice gates	On the day of the inspection, both sluice gates were observed to be open. The sluice gates should be operated according to a philosophy where one gate is open and the other is closed to facilitate the use of a single compartment at a time	N/A
Liner	Sections of underlining HDPE liner was observed. Design drawings are required to confirm the presence of the liner	Photo 4
Safety	No safety case was observed within the compartments of PCD 4. A safety case containing life jackets, a life buoy, and other required safety equipment is necessary for compliance	Photo 2, 5, & 6
Safety	"No Entry" sign was not observed at the entrance. Adequate signage is required. Additionally, one of the access gates was open on the day of the inspection. Adequate access control is required	Photo 16 & 17
Safety	No emergency numbers observed at the compartment. Emergency numbers are required on the safety board	Photo 18
Documentation	No information was available or provided regarding PCD 4 prior to the inspection. Proper management and monitoring of the dam, along with effective documentation control and record-keeping, are required	N/A

APPENDICES

1. **APPENDIX – Site inspection Photos**

Wall Embankment

Photo 1: Wall crest condition  Unsatisfactory An uneven walkway was observed on the crest, which needs to be levelled by adding a 150mm layer of G5 material	**Photo 2:** Wall inner slope condition  Unsatisfactory Vegetation growth noted on the inner wall slope

Photo 3: Erosion gullies  Unsatisfactory Erosion gullies observed near the silt trap area	**Photo 4:** Vegetation  Unsatisfactory Vegetation noted on the inside and outside wall. Additionally, sections of HDPE liner were observed

Dam Basin

Photo 5: Dam basin	**Photo 6:** Dam basin
	
Unsatisfactory Minor vegetation observed at the dam basin	Unsatisfactory Minor vegetation observed at the dam basin

Inlet

Photo 7: Inlet channel

Satisfactory
No concerns

Photo 8: Inlet pipes

Satisfactory
No concerns

Outlet Works

Photo 9: Pumpstation  Satisfactory No leakages noted	**Photo 10:** Outlet pipes  Satisfactory No concerns

Spillway

Photo 11: Outflow spillway  Satisfactory No concerns	**Photo 12:** Outflow spillway  Satisfactory No concerns

Photo 13: Leakeage detectors

Satisfactory
No concerns

Photo 14: Flow monitor

Satisfactory
No concerns

Safety and Security

Photo 15: Safety Buoy

Unsatisfactory

No safety nets and safety bouys noted. This must be verified against the Seriti safety standard

Photo 16: Safety Signage

Unsatisfactory

"No Entry" signage missing at the entrance. Adequate signage is required

Photo 17: Fence  Satisfactory Adequate access control was observed on-site	**Photo 18:** Safety equipment  Unsatisfactory No emergency numbers observed at the compartment. Emergency numbers are required on the safety board. Additionally, there was no safet case observed

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Our focus is to provide specialist technical expertise and solutions to the mining industry. Previously the technical department of Anglo American's corporate office, the consulting team have combined their mining, project, geosciences, and technology expertise to form the entity Isithelo - Mining Products and Services.

From exploration to mine closure our areas of specialization include geosciences, project engineering and integration, safety and sustainability, mining, drilling, and blasting, comprehensive engineering services and change management specific to improved operational performance.

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Materials Handling Department Belt Condition Monitoring, Design Reviews, Discrete Element Modelling of Flow, Dust Management, Equipment Monitoring, Instrumentation, Flow Properties Testing, Mechanical Conveyor Design, System Audits. Equipment Selection and Concept Studies.

Industrial Engineering Dynamic simulation modelling (processes), capacity evaluation and optimisation, time and motion studies, facility layout planning, Lean Six Sigma DMAIC and DMADV, operations analysis, financial modelling, design of experiments.

Materials Engineering Failures Investigations, Remaining Life Assessment, Materials of construction selections, Welding Inspections, reviews and Designs, Coating selections and specifications, Mechanical Testing, Corrosion studies, On Site inspections and assessments, NDT testing

Mechanical Engineering Structural FEA (Static/Dynamic/Explicit), Multi Body Dynamics, Metal Fatigue Analysis, Test and Measurement, Investigations/Design Reviews, Tyre Pyrolysis and Fatality Investigations

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Directors: Jose Prozzi
Company Registration Number: 2015/17148/07

Isithelo Mining Consultants and Services (Pty) Ltd
Queries : contact@isithelo.com
Contact : +27 11 880 6338
www.isithelo.com

Engineering | Quality | Geoscience | Mining | Minerals Residue
www.isithelo.com Tel: +27 11 880 6338

KLIPSPRUIT COAL MINE

POLLUTION CONTROL DAM 2

ANNUAL DAM SAFETY INSPECTION

52W Circ Civil Eng Dam Insp EVN-X-C02A
52W Circ Civil Eng Dam Insp EVN-X-C02B

Klipspruit Coal Mine
eMalahleni
Mpumalanga
South Africa

Isithelo Mining Consultants (Pty) Ltd
Project Number: 4679

12 May 2025

Isithelo , Mining Consultants and Services (Pty) Ltd
19 Autumn Street, Rivonia 2128 , Johannesburg , South Africa
Reg : 2015/171486/07
VAT No.:4780271492
Postnet Suite #109 Private Bag 51 Rivonia 2128

Geoscience | Mining | Minerals Residue | Engineering | Quality Management

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ITH4679-RPT-02

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12 May 2025

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POLLUTION CONTROL DAM 2 – ANNUAL DAM SAFETY INSPECTION
52W Circ Civil Eng Dam Insp EVN-X-C02A C02B

Client:
Klipspruit Coal Mine

Distribution List
External:
Klipspruit Coal Mine

Internal:

Author(s):

AMasarira
……
Neo Tamako (Civil Engineer)
Alvin Masarira (Principal Engineer)

Tel: +27 11 880 6338
Fax: +27 86 443 2984
Email: contact@isithelo.com
www.isithelo.com

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ACTION	FUNCTION	NAME	DATE	SIGNATURE
PREPARED	Civil Engineer	N Tamako	05.05.2025	
REVIEWED	Principal Civil Engineer	A Masarira	06.05.2025	
APPROVED	Director	J Prozzi	07.05.2025	

RECORD OF REVISIONS AND ISSUES REGISTER

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1. CONTENTS

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ii. LIST OF TABLES

1. INTRODUCTION

1.1 Purpose

Isithelo Mining Consultants Pty Ltd (herein referred to as Isithelo) was commissioned by Klipspruit Colliery Pty Ltd (herein referred to as Klipspruit) to conduct an annual dam safety assessment for their dams. These dams are situated at their operational site near Ogies, situated within the Mpumalanga Province of South Africa.

1.2 Ownership

Klipspruit is an open-cast coal mine operated by Thabong Coal, a subsidiary of Seriti Resources, and produces approximately 8 million tonnes per annum (Mtpa) of Run-of-Mine (RoM) thermal coal. The mine is undergoing an expansion project known as the Weltevreden coal project, aimed at increasing the operational life of the colliery. Historically, Klipspruit was operated by South Africa Energy Coal (SAEC), a subsidiary of South 32, and before that by BHP Billiton Energy Coal South Africa, a division of BHP Billiton. The coal extracted at Klipspruit is classified as medium-rank bituminous thermal coal, suitable for beneficiation and export to European and Asian markets. Initially, coal was transported 34 km to the Rietspruit Wash Plant for processing and loading onto trains. However, this changed with the establishment of the Phola Coal Processing Plant. In December 2007, BHP Billiton and Anglo Coal formed a 50:50 joint venture to construct the Phola Coal Processing Plant on the Klipspruit site. The facility, with a design capacity of 16 Mtpa, processes RoM coal equally split between the two partners, thereby enabling the Klipspruit mine to reach its full 8 Mtpa production capacity. The Rietspruit washery was subsequently decommissioned in August 2009.

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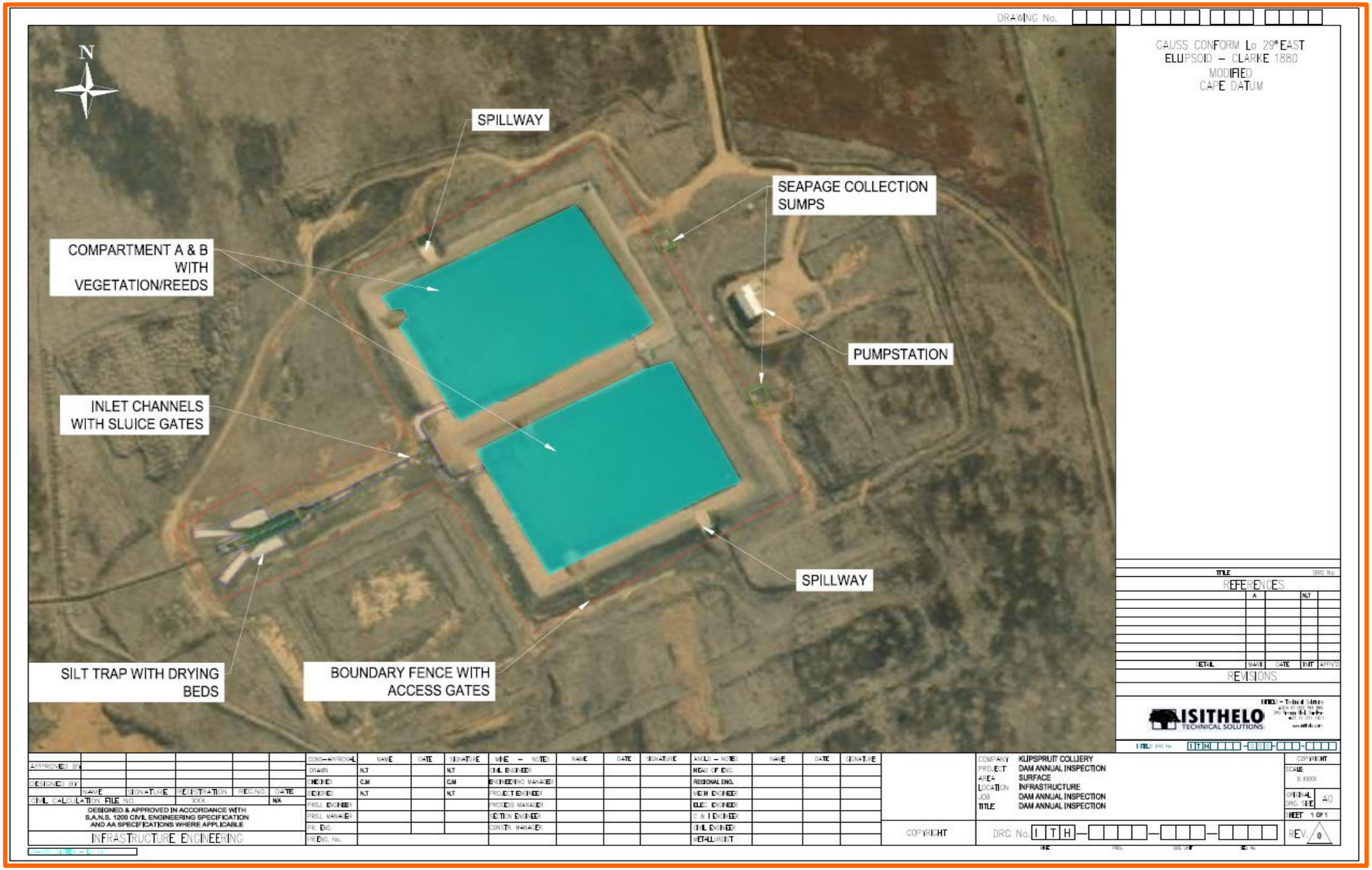
1.3 Location

Klipspruit is located approximately 4 kilometers west of Ogies in Mpumalanga Province, within the Nkangala District Municipality and the eMalahleni Local Municipality. The facility is bordered by the R555 provincial road to the south, the R545 provincial road to the east, and the N12 national road to the north (Refer to). This report focuses on Pollution Control Dam 2 (herein referred to as PCD 2), with its layout depicted in Figure 1-2.

Figure 1-1: Location of Klipspruit Coal Mine

Figure 1-2: Pollution Control dam 2 Layout



1.4 Dam Description

PCD 2 is designed to manage process water and stormwater runoff from the mine's open-cast coal operations. The dam is divided into two compartments, Compartment A and Compartment B, to enhance operational efficiency and maintenance. An inlet channel with a sluice gate regulates water flow, allowing each compartment to operate independently. This design enables one compartment to remain active while the other is cleaned or maintained, ensuring continuous water management. Table 1-1 provides a summary of PCD 2's characteristics based on measurements taken during the annual safety inspection.

Table 1-1: Dam Summary

Description	Value
Embankment type	Homogenous earth fill with a geofabric membrane
Maximum wall height	±3.5 m
Crest length	190 m
Crest width	5 m
Storage capacity at FSL	±56 000 m^3
Surface area at FSL	16 000 m^2
Lining parameters	Earth lined (no geomembrane lining)
Water source	Direct rainfall, process water, and stormwater runoff from the mine's open-cast coal operations
Dam use	N/A
Upstream Slope	Inner slopes 1V:3H
Downstream Slope	Outer slopes 1V:2.2H Erosion protection: 75 mm topsoil and vegetation
Outlet pipe	Three (3) No. 100 mm diameter steel pipe
Drainage System	A concrete seepage detector structure along the downstream toe of each compartment, filled with 13 mm crushed stone and a 100 mm slotted drainpipe
Outflow Spillway	Concrete Lined trapezoidal overbank spillway

2. OBJECTIVE

An annual dam safety evaluation was carried out in terms of Dam Safety Regulation no 139 of the National Water Act, 1998. The main purpose of the annual dam inspection is to assess the present condition of the retaining water dam and confirm its current state and suitability for continued operations. This report provides the record of the observations following the dam safety inspection as well as recommendations on improving the present condition of the dam.

3. EXCLUSIONS

The following tasks will not be carried out and documented as part of the dam safety evaluation:

- Design adequacy review
- Construction defects
- Risk Assessments in relation to the operation of the dam

4. INFORMATION

4.1 Information Available

Prior to the inspection of PCD 2, no detailed information regarding the dam's design, construction, operational history, or previous inspections was available. Consequently, this report represents the initial dam safety assessment and serves as a critical baseline for evaluating the dam's condition, structural integrity, and compliance with Department of Water and Sanitation (DWS) regulations. Observations and measurements recorded during the inspection, as summarized in Table 1-1, form the primary basis for this assessment. Future inspections are recommended to build on this baseline and incorporate additional data, such as design specifications or operational records, if they become available.

4.2 Information Not Available

The following information was not available prior to the publication of the inspection report:

- Emergency Response plan and Emergency Preparedness plan;
- Maintenance records;
- Daily Inspection sheets. Klipspruit Colliery Mine (Pty) Ltd;
- Klipspruit Colliery Pollution Control Dam Design and Construction Report;
- Klipspruit Colliery Pollution Control Dam Operation and Maintenance Manual;
- Construction design drawings;
- Previous inspection reports; and
- Pollution Control Dam Annual Dam Safety Inspection Report.

5. DAM INSPECTION

A site inspection of the dam was undertaken on the 26TH of March 2025 by the following personnel:

- Alvin Masarira (Professional Civil Engineer);
- Rifumu Mabasa (Civil Engineer);
- Katlego Molefe (Civil Engineer); and
- Neo Tamako (Civil Engineer).

The weather at the time of the inspection was 24 degrees Celsius. The dam water level was visually noted to be 20% full. The various components of the dam were inspected, and relevant observations were made and documented in the subsequent pages of this report.

5.1 Wall Embankment

Table 5-1: Wall Embankment Condition

No.	Indicator	Comments
1	Wall type	Homogenous earth fill with a geofabric membrane
2	Wall crest condition	The crest requires grass removal
3	Visibility of erosion	Minor spots observed
4	Settlement	None observed
5	Seepage	None observed
6	Wall movement	Fill material noted on the western wall of the compartment
7	Vegetation on wall (trees, shrubs)	Minor shrubs were observed on the crest of the dam
8	Holes (rats, ants, meerkats, moles, etc)	Excessive rat/mole holes observed on the wall embankment
9	Grass condition	Minor grass cutting is required on the embankment
10	Alterations on wall	None observed
11	Photo reference	Photo 1 to Photo 4 in **Error! Reference source not found.**

5.2 Dam Basin

Table 5-2: Dam Basin Condition

No.	Indicator	Comments
1	Dam basin	Excessive reeds have been observed inside the dam basin. These need to be removed to restore the dam's capacity
2	Rip rap condition	No concerns
3	Photo reference	Photo 5 and Photo 6 in **Error! Reference source not found.**

5.3 Inlet

The inlet to PCD 2 comprises a concrete channel that directs water through a silt trap, allowing sediments to settle before entering the dam. The channel is equipped with two sluice gates to regulate water flow, facilitating the operation of one compartment while the other is maintained.

Table 5-3: Dam Inlet Condition

No.	Indicator	Comments
1	Pipe condition	No concerns
2	Water flow	Water quality report needs to be provided
3	Flow meter functionality	None observed

4	Photo reference	Photo 7 and Photo 10 in **Error! Reference source not found.**

5.4 Outlet

The outlet works are located west of the dam. The outlet works include three (3) 100mm Ø steel pipes that are connected to a suction at the inlet.

Table 5-4: Dam Outlet Condition

No.	Indicator	Comments
1	Leakages	No leakages detected
2	Pipe condition	No concerns
3	Valve condition	No concerns
4	Downstream erosion	None observed
5	Photo reference	Photo 11 and Photo 12 in **Error! Reference source not found.**

5.5 Spillway

Each compartment of the dam features an outflow spillway positioned along its side.

Table 5-5: Outflow Spillway Condition

No.	Indicator	Comments
1	Spillway type	Concrete
2	Erosion	None observed
3	Structure condition	No defects observed. The structure complies to GN704 legal requirements
4	Shrubs, trees, or reeds	Excessive reeds growth noted on the spillway
5	Blockages	None observed
6	Water flowing	No water overflow observed
7	Rip rap condition	No concerns
8	Downstream channel condition	No concerns
9	Culverts	None observed
10	Photo reference	Photo 13 to Photo 14 in **Error! Reference source not found.**

5.6 Safety and Security

Table 5-6: Safety and Security Condition

No.	Indicator	Comments
1	Fence condition	No concerns
2	Access roads	No concerns
3	Gate conditions	One of the gate entrances was open on the day of the inspection

4	Signage	Poor signage observed
5	Safety buoys condition	No safety netting or floating buoys were observed during the inspection. This must be verified against the Seriti safety standard
6	Fire breaks	No concerns
7	Emergency contact numbers	No emergency contact numbers observed
8	Emergency case	No emergency case observed
9	Photo reference	Photo 15 to Photo 18 in **Error! Reference source not found.**

6. RECOMMENDATIONS

Table 6-1 provides the details the recommendations for the current site inspection completed by Isithelo on the 26th of March 2025.

Table 6-1: Updated recommendations

Description	Recommendations	Photo reference
Vegetation	Grass growth observed on the crest of the dam. The grass should be removed on the crest of the wall	Photo 5 & 6
Rat/mole holes	Multiple rat holes were observed on the embankment wall. These holes should be fumigated and sealed to prevent interference with the stability of the dam wall.	Photo 4
Safety nets	No safety netting or floating buoys were observed during the inspection. This must be verified against the Seriti safety standard	Photo 2, 5, & 6
Dam basin	Excessive reeds were observed inside the dam basin. Removal of the reeds is required to restore the dam to its full capacity	Photo 5 & 6
Silt trap	Minor reed growth noted along the silt trap. The vegetation needs to be removed	Photo 7
Inlet channel	Minor accumulation was noted inside the inlet channel. The silt needs to be cleaned to restore the channel's full function	Photo 7
Liner	No HDPE liner was observed in PCD 2. According to GN704 legal requirements, an HDPE liner is mandatory for compliance	Photo 2, 5, & 6
Safety	No safety case was observed within the compartments of PCD 2. A safety case containing life jackets, a life buoy, and other required safety equipment is necessary for compliance	Photo 16 & 18
Safety	"No Entry" sign was not observed at the entrance. Adequate signage is required	Photo 16 & 18
Safety	On the day of the inspection, one of the entrance gates was left open. Adequate access control is required	Photo 16
Safety	No emergency numbers were observed at the compartment. Adequate signage is required on the safety board	Photo 18

Wall embankment	Water flow was observed near the toe of the northern embankment wall. If this flow originates from the spillway, the overflow spillway channel should be redefined. Otherwise, the source of the water flow requires further investigation	Photo 17
Documentation	No information was available or provided regarding PCD 2 prior to the inspection. Proper management and monitoring of the dam, along with effective documentation control and record-keeping, are required	N/A

APPENDIX- Site Inspection Photos

Photo 1: Wall crest condition  Satisfactory No concerns	**Photo 2:** Wall crest condition  Unsatisfactory Excess fill material was noted on the inner slope of the embankment wall, indicating a potential deviation from the original design shape of the compartment

Photo 3: Grass condition  Note: Grass-cutting were carried out at the time of inspection	**Photo 4:** Holes on embankment  Unsatisfactory Multiple holes were observed on the toe of the wall.

Dam Basin

Photo 5: Dam basin  Unsatisfactory Reeds observed growing inside the dam basin	**Photo 6:** Dam basin  Unsatisfactory Reeds observed growing inside the dam basin

Inlet

Photo 7: Inlet channel	**Photo 8:** Inlet pipes
	
Unsatisfactory Silt accumulation inside the inlet channel leading to the silt trap	Satisfactory No concerns

Photo 9: Silt trap  Satisfactory The concrete structure of the silt trap was observed to be in good condition and well-maintained.	**Photo 10:** Inlet channel  Unsatisfactory Vegetation growth observed inside the channel from silt trap compartment to the dam

Outlet Works

Photo 11: Flow meter  Satisfactory Flow meter observed. The data should also be recorded and shared with Isithelo	**Photo 12:** Pumpstation  Satisfactory No concerns

Spillway

Photo 13: Overflow spillway

Unsatisfactory
Minor vegetation growth along the spillway

Photo 14: Leakage detector

Satisfactory
No concerns

Safety and Security

Photo 15: Safety Buoy  Unsatisfactory No HDPE liner, safety nets, and safety bouys noted. This must be verified against the Seriti safety standard	**Photo 16:** Safety Signage  Unsatisfactory One of the gates was not locked on the day of the inspection

Photo 17: Flow  Unsatisfactory Water flow was noted near the toe of the northern embankment wall	**Photo 18:** Safety equipment  Unsatisfactory No emergency numbers observed at the compartment. Emergency numbers are required on the safety board. Additionally, there was no safet case observed

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Geoscience Department Geological / Geophysical Consulting, employing advanced techniques of applied geophysics across the full mining value chain and in other industries.

Directors: Jose Prozzi
Company Registration Number: 2015/17148/07

Isithelo Mining Consultants and Services (Pty) Ltd
Queries : contact@isithelo.com
Contact : +27 11 880 6338
www.isithelo.com

Engineering | Quality | Geoscience | Mining | Minerals Residue
www.isithelo.com Tel: +27 11 880 6338

KLIPSPRUIT COAL MINE

POLLUTION CONTROL DAM 3

ANNUAL DAM SAFETY INSPECTION

Klipspruit Coal Mine
eMalahleni
Mpumalanga
South Africa

52W Circ Civil Eng Dam Insp EVN-X-C03A
52W Circ Civil Eng Dam Insp EVN-X-C03B

Isithelo Mining Consultants (Pty) Ltd
Project Number: **ITH4679**

12 May 2025

Isithelo , Mining Consultants and Services (Pty) Ltd
19 Autumn Street, Rivonia 2128 , Johannesburg , South Africa
Reg : 2015/171486/07
VAT No.:4780271492
Postnet Suite #109 Private Bag 51 Rivonia 2128

Geoscience | Mining | Minerals Residue | Engineering | Quality Management

Isithelo Document No: ITH4679-RPT-03	**Date:** 12 May 2025

Report Title:
POLLUTION CONTROL DAM 3 – ANNUAL DAM SAFETY INSPECTION
52W Circ Civil Eng Dam Insp EVN-X-C01A C01B

Client: Klipspruit Coal Mine	**Distribution List** **External:** Klipspruit Coal Mine **Internal:**

Author(s):

A Masarira
.....
Neo Tamako (Civil Engineer)
Alvin Masarira (Principal Engineer)

Tel: +27 11 880 6338
Fax: +27 86 443 2984
Email: contact@isithelo.com
www.isithelo.com

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PREPARED	Civil Engineer	N Tamako	05.05.2025	
REVIEWED	Principal Civil Engineer	A Masarira	06.05.2025	
APPROVED	Director	J Prozzi	08.05.2025	

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1. CONTENTS

i. LIST OF FIGURES

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1. INTRODUCTION

1.1 Purpose

Isithelo Mining Consultants Pty Ltd (herein referred to as Isithelo) was commissioned by Klipspruit Colliery Pty Ltd (herein referred to as Klipspruit) to conduct an annual dam safety assessment for their dams. These dams are situated at their operational site near Ogies, situated within the Mpumalanga Province of South Africa.

1.2 Ownership

Klipspruit is an open-cast coal mine operated by Thabong Coal, a subsidiary of Seriti Resources, and produces approximately 8 million tonnes per annum (Mtpa) of Run-of-Mine (RoM) thermal coal. The mine is undergoing an expansion project known as the Weltevreden coal project, aimed at increasing the operational life of the colliery. Historically, Klipspruit was operated by South Africa Energy Coal (SAEC), a subsidiary of South 32, and before that by BHP Billiton Energy Coal South Africa, a division of BHP Billiton. The coal extracted at Klipspruit is classified as medium-rank bituminous thermal coal, suitable for beneficiation and export to European and Asian markets. Initially, coal was transported 34 km to the Rietspruit Wash Plant for processing and loading onto trains. However, this changed with the establishment of the Phola Coal Processing Plant. In December 2007, BHP Billiton and Anglo Coal formed a 50:50 joint venture to construct the Phola Coal Processing Plant on the Klipspruit site. The facility, with a design capacity of 16 Mtpa, processes RoM coal equally split between the two partners, thereby enabling the Klipspruit mine to reach its full 8 Mtpa production capacity. The Rietspruit washery was subsequently decommissioned in August 2009.

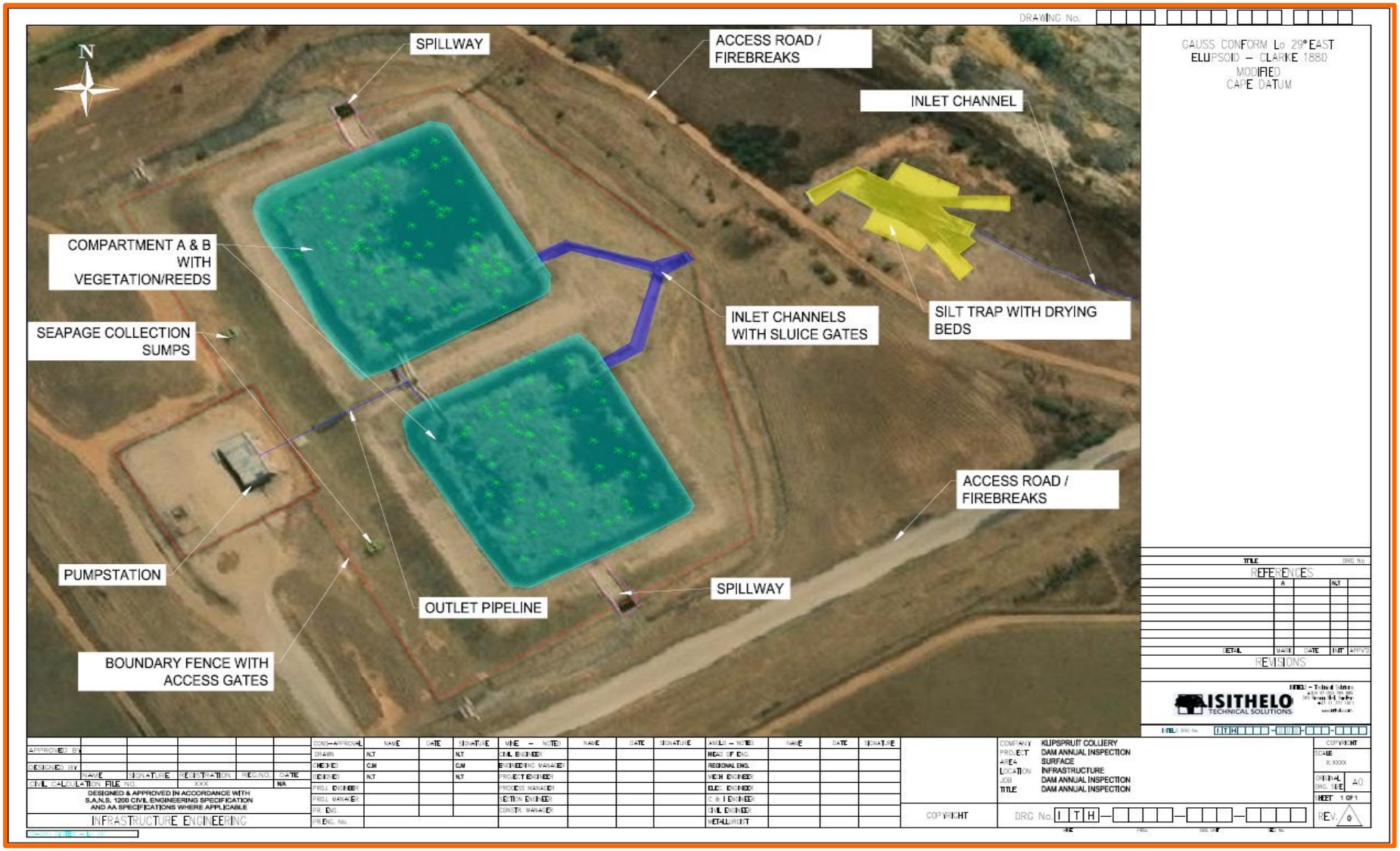
Export coal from Klipspruit is transported via Spoornet, a government-owned railway operator, to the Richards Bay Coal Terminal (RBCT), of which the mine's original operator was a part-owner. Following the commissioning of the Phola Plant, BHP anticipated 4 Mtpa of Klipspruit coal would be exported via RBCT. As of BHP's 2009 report, Klipspruit held an Old Order Mining Right, with a New Order Mining Right application submitted in 2004, pending processing at the time. The project had environmental approval from the Mpumalanga Department of Agriculture, Conservation and Environment since 2003. Initial mining commenced in August 2003 through truck-and-shovel contractor methods. In June 2021, Seriti Resources officially acquired South 32's shareholding in SAEC, thereby taking full operational control of Klipspruit.

1.3 Location

Klipspruit is located approximately 4 kilometers west of Ogies in Mpumalanga Province, within the Nkangala District Municipality and the eMalahleni Local Municipality. The facility is bordered by the R555 provincial road to the south, the R545 provincial road to the east, and the N12 national road to the north (Refer to). This report focuses on Pollution Control Dam 3 (herein referred to as PCD 3), with its layout depicted in Figure 1-2.

Figure 1-1: Location of Klipspruit Coal Mine

Figure 1-2: Pollution Control dam 3 Layout



1.4 Dam Description

PCD 3 is designed to manage process water and stormwater runoff from the mine's open-cast coal operations. The dam is divided into two compartments, Compartment A and Compartment B, to enhance operational efficiency and maintenance. An inlet channel with a sluice gate regulates water flow, allowing each compartment to operate independently. This design enables one compartment to remain active while the other is cleaned or maintained, ensuring continuous water management. Table 1-1 provides a summary of PCD 3's characteristics based on measurements taken during the annual safety inspection.

Table 1-1: Dam Summary

Description	Value
Embankment type	Homogenous earth fill with a geofabric membrane
Maximum wall height	±3.5 m
Crest length	190 m
Crest width	5 m
Storage capacity at FSL	±56 000 m^3
Surface area at FSL	16 000 m^2
Lining parameters	Earth lined (no geomembrane lining)
Water source	Direct rainfall, process water, and stormwater runoff from the mine's open-cast coal operations
Dam use	N/A
Upstream Slope	Inner slopes 1V:3H
Downstream Slope	Outer slopes 1V:2.2H Erosion protection: 75 mm topsoil and vegetation
Outlet pipe	Three (3) No. 100 mm diameter steel pipe
Drainage System	A concrete seepage detector structure along the downstream toe of each compartment, filled with 13 mm crushed stone and a 100 mm slotted drainpipe
Outflow Spillway	Concrete Lined trapezoidal overbank spillway

2. OBJECTIVE

An annual dam safety evaluation was carried out in terms of Dam Safety Regulation no 139 of the National Water Act, 1998. The main purpose of the annual dam inspection is to assess the present condition of the retaining water dam and confirm its current state and suitability for continued operations. This report provides the record of the observations following the dam safety inspection as well as recommendations on improving the present condition of the dam.

3. EXCLUSIONS

The following tasks will not be carried out and documented as part of the dam safety evaluation:

- Design adequacy review
- Construction defects
- Risk Assessments in relation to the operation of the dam

4. INFORMATION

4.1 Information Available

Prior to the inspection of PCD 3, no detailed information regarding the dam's design, construction, operational history, or previous inspections was available. Consequently, this report represents the initial dam safety assessment and serves as a critical baseline for evaluating the dam's condition, structural integrity, and compliance with Department of Water and Sanitation (DWS) regulations. Observations and measurements recorded during the inspection, as summarized in Table 1-1, form the primary basis for this assessment. Future inspections are recommended to build on this baseline and incorporate additional data, such as design specifications or operational records, if they become available.

4.2 Information Not Available

The following information was not available prior to the publication of the inspection report:

- Emergency Response plan and Emergency Preparedness plan;
- Maintenance records;
- Daily Inspection sheets. Klipspruit Colliery Mine (Pty) Ltd;
- Klipspruit Colliery Pollution Control Dam Design and Construction Report;
- Klipspruit Colliery Pollution Control Dam Operation and Maintenance Manual;
- Construction design drawings;
- Previous inspection reports; and
- Pollution Control Dam Annual Dam Safety Inspection Report.

5. DAM INSPECTION

A site inspection of the dam was undertaken on the 26TH of March 2025 by the following personnel:

- Alvin Masarira (Professional Civil Engineer);
- Rifumu Mabasa (Civil Engineer);
- Katlego Molefe (Civil Engineer); and
- Neo Tamako (Civil Engineer).

The weather at the time of the inspection was 24 degrees Celsius. The dam water level was visually noted to be 20% full. The various components of the dam were inspected, and relevant observations were made and documented in the subsequent pages of this report.

5.1 Wall Embankment

Table 5-1: Wall Embankment Condition

No.	Indicator	Comments
1	Wall type	Homogenous earth fill with a geofabric membrane
2	Wall crest condition	The crest requires grass removal
3	Visibility of erosion	Minor spots observed
4	Settlement	None observed
5	Seepage	None observed
6	Wall movement	None observed
7	Vegetation on wall (trees, shrubs)	Minor shrubs were observed on the crest of the dam
8	Holes (rats, ants, meerkats, moles, etc)	None observed
9	Grass condition	Minor grass cutting is required on the embankment
10	Alterations on wall	None observed
11	Photo reference	Photo 1 to Photo 4 in APPENDIX– Site inspection Photos

5.2 Dam Basin

Table 5-2: Dam Basin Condition

No.	Indicator	Comments
1	Dam basin	Excessive reeds have been observed inside the dam basin. These need to be removed to restore the dam's capacity
2	Rip rap condition	No concerns
3	Photo reference	Photo 5 and Photo 6 in APPENDIX– Site inspection Photos

5.3 Inlet

The inlet consists of three (3) concrete 450mm Ø pipes that discharge water into the concrete channel that directs the flow into the dam.

Table 5-3: Dam Inlet Condition

No.	Indicator	Comments
1	Pipe condition	No concerns
2	Water flow	Water quality report needs to be provided
3	Flow meter functionality	None observed
4	Photo reference	Photo 7 and Photo 8 in APPENDIX– Site inspection Photos

5.4 Outlet

The outlet works are located west of the dam. The outlet works include three (3) 100mm Ø steel pipes that are connected to a suction at the inlet.

Table 5-4: Dam Outlet Condition

No.	Indicator	Comments
1	Leakages	No leakages detected
2	Pipe condition	No concerns
3	Valve condition	No concerns
4	Downstream erosion	None observed
5	Photo reference	Photo 9 and Photo 10 in APPENDIX– Site inspection Photos

5.5 Spillway

Each compartment of the dam features an outflow spillway positioned along its side.

Table 5-5: Outflow Spillway Condition

No.	Indicator	Comments
1	Spillway type	Concrete
2	Erosion	None observed
3	Structure condition	No defects observed. The structure complies to GN704 legal requirements
4	Shrubs, trees, or reeds	Minor vegetation noted on the spillway toe
5	Blockages	None observed
6	Water flowing	No water overflow observed
7	Rip rap condition	No concerns
8	Downstream channel condition	No concerns
9	Culverts	None observed
10	Photo reference	Photo 11 to Photo 14 in APPENDIX– Site inspection Photos

5.6 Safety and Security

Table 5-6: Safety and Security Condition

No.	Indicator	Comments
1	Fence condition	No concerns
2	Access roads	No concerns
3	Gate conditions	No concerns
4	Signage	No concerns

5	Safety buoys condition	No safety netting or floating buoys were observed during the inspection. This must be verified against the Seriti safety standard
6	Fire breaks	No concerns
7	Emergency contact numbers	No emergency contact numbers were observed
8	Emergency case	No emergency case observed
9	Photo reference	Photo 15 to Photo 18 in APPENDIX– Site inspection Photos

6. RECOMMENDATIONS

Table 6-1 provides the details the recommendations for the current site inspection completed by Isithelo on the 26th of March 2025.

Table 6-1: Updated recommendations

Description	Recommendations	Photo reference
Vegetation	Minor shrubs were observed on the inner slopes of the dam. Unwanted vegetation to be removed	Photo 4 & 15
Safety nets	No safety netting or floating buoys were observed during the inspection. This must be verified against the Seriti safety standard	Photo 15
Dam basin	Excessive reeds and silt observed inside the dam basin. Monitoring of the reeds and management is required	Photo 5 & 6
Inlet channel	Vegetation growth noted along the concrete joints of the channel. The vegetation needs to be removed, and the joints need to be sealed	Photo 7
Sluice gates	On the day of the inspection, both sluice gates were observed to be open. The sluice gates should be operated according to a philosophy where one gate is open and the other is closed to facilitate the use of a single compartment at a time	Photo 7
Liner	No HDPE liner was observed in PCD 3. According to GN704 legal requirements, an HDPE liner is mandatory for compliance	Photo 1, 2, & 6
Safety	No safety case was observed within the compartments of PCD 3. A safety case containing life jackets, a life buoy, and other required safety equipment is necessary for compliance	Photo 16 & 18
Safety	“No Entry” sign was not observed at the entrance. Adequate signage is required	Photo 18
Safety	No emergency numbers observed at the compartment. Emergency numbers are required on the safety board	Photo 18
Documentation	No information was available or provided regarding PCD 3 prior to the inspection. Proper management and monitoring of the dam, along with effective documentation control and record-keeping, are required	N/A

APPENDICES

1. **APPENDIX– Site inspection Photos**

Wall Embankment

Photo 1: Wall crest condition  Unsatisfactory An uneven walkway was observed on the crest, which needs to be levelled by adding a 150mm layer of G5 material	**Photo 2:** Wall crest condition  Unsatisfactory Vegetation growth noted on the wall crest

Photo 3: Grass condition  Note: Grass-cutting were carried out at the time of inspection	**Photo 4:** Vegetation  Unsatisfactory Vegetation noted on the inside and outside wall. The vegetation needs to be removed and treated

Dam Basin

Photo 5: Dam basin	**Photo 6:** Dam basin
	
Unsatisfactory Reeds observed at the dam basin	Unsatisfactory Reeds observed at the dam basin

Inlet

Photo 7: Inlet channel	**Photo 8:** Inlet pipes
	
Unsatisfactory Concrete channels were well maintained. However, minor vegetation growth was observed on the joints. Additionally, the sluice gates were both open on the day of the inspection	Incomplete Vegetation has been removed from the rip-rap. However, silt was observed accumulating inside the pipes

Outlet Works

Photo 9: Pumstation	**Photo 10:** Outlet pipes
	
Satisfactory No leakages noted	Satisfactory No concerns

Spillway

Photo 11: Outflow spillway  Unsatisfactory Minor reeds were noted on the spillway at compartment A. Reeds should be removed to prevent any blockages	**Photo 12:** Outflow spillway  Unsatisfactory Minor reeds were noted on the spillway at compartment B. Reeds should be removed to prevent any blockages

Photo 13: Leakage detectors  Satisfactory No concerns	**Photo 14:** Flow monitor  Satisfactory No concerns

Safety and Security

Photo 15: Safety Buoy

Unsatisfactory

No HDPE liner, safety nets, and safety bouys noted. This must be verified against the Seriti safety standard

Photo 16: Safety Signage

Unsatisfactory

"No Entry" signage missing at the entrance. Adequate signage is required

Photo 17: Fence	**Photo 18:** Safety equipment
	
Satisfactory Adequate access control was observed on-site	Unsatisfactory No emergency numbers observed at the compartment. Emergency numbers are required on the safety board. Additionally, there was no safet case observed

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Directors: Jose Prozzi
Company Registration Number: 2015/17148/07

Isithelo Mining Consultants and Services (Pty) Ltd
Queries : contact@isithelo.com
Contact : +27 84 833 1114
www.isithelo.com

Engineering | Quality | Geoscience | Mining | Minerals Residue
www.isithelo.com Tel: +27 11 880 6338

KLIPSPRUIT COAL MINE

POLLUTION CONTROL DAM 4

ANNUAL DAM SAFETY INSPECTION

52W Circ Civil Eng Dam Insp EVN-X-C04

Klipspruit Coal Mine
eMalahleni
Mpumalanga
South Africa

Isithelo Mining Consultants (Pty) Ltd
Project Number: 4679

12 May 2025

Isithelo , Mining Consultants and Services (Pty) Ltd
19 Autumn Street, Rivonia 2128 , Johannesburg , South Africa
Reg : 2015/171486/07
VAT No.:4780271492
Postnet Suite #109 Private Bag 51 Rivonia 2128

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52W Circ Civil Eng Dam Insp EVN-X-C04

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Distribution List
External:
Klipspruit Coal Mine

Internal:

Author(s):

AMasarira
.....
Neo Tamako (Civil Engineer)
Alvin Masarira (Principal Engineer)

Tel: +27 11 880 6338
Fax: +27 86 443 2984
Email: contact@isithelo.com
www.isithelo.com

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ACTION	FUNCTION	NAME	DATE	SIGNATURE
PREPARED	Civil Engineer	N Tamako	05.05.2025	
REVIEWED	Principal Civil Engineer	A Masarira	06.05.2025	
APPROVED	Director	J Prozzi	07.05.2025	

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1. CONTENTS

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ii. LIST OF TABLES

1. INTRODUCTION

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1.2 Ownership

Klipspruit is an open-cast coal mine operated by Thabong Coal, a subsidiary of Seriti Resources, and produces approximately 8 million tonnes per annum (Mtpa) of Run-of-Mine (RoM) thermal coal. The mine is undergoing an expansion project known as the Weltevreden coal project, aimed at increasing the operational life of the colliery. Historically, Klipspruit was operated by South Africa Energy Coal (SAEC), a subsidiary of South 32, and before that by BHP Billiton Energy Coal South Africa, a division of BHP Billiton. The coal extracted at Klipspruit is classified as medium-rank bituminous thermal coal, suitable for beneficiation and export to European and Asian markets. Initially, coal was transported 34 km to the Rietspruit Wash Plant for processing and loading onto trains. However, this changed with the establishment of the Phola Coal Processing Plant. In December 2007, BHP Billiton and Anglo Coal formed a 50:50 joint venture to construct the Phola Coal Processing Plant on the Klipspruit site. The facility, with a design capacity of 16 Mtpa, processes RoM coal equally split between the two partners, thereby enabling the Klipspruit mine to reach its full 8 Mtpa production capacity. The Rietspruit washery was subsequently decommissioned in August 2009.

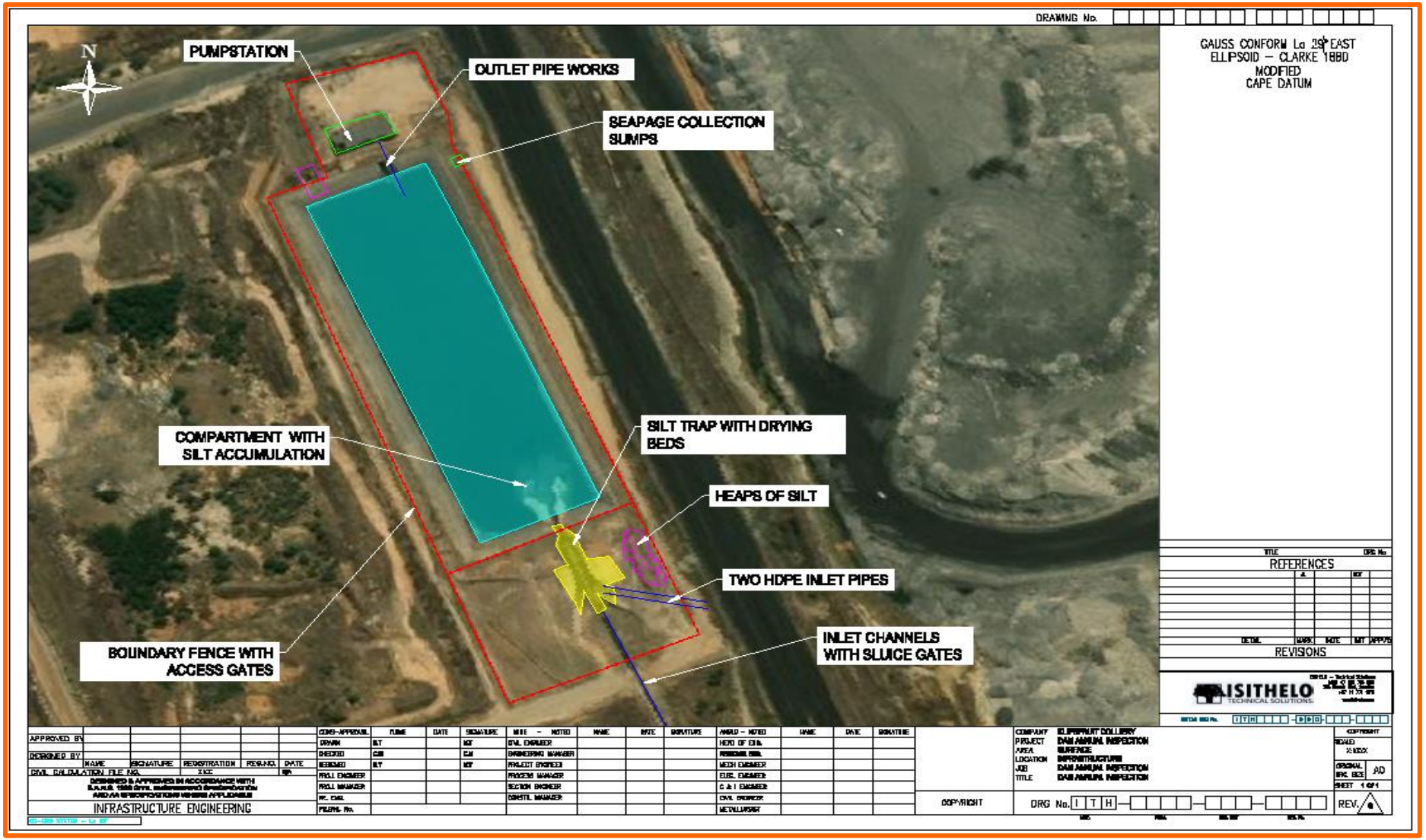
Export coal from Klipspruit is transported via Spoornet, a government-owned railway operator, to the Richards Bay Coal Terminal (RBCT), of which the mine's original operator was a part-owner. Following the commissioning of the Phola Plant, BHP anticipated 4 Mtpa of Klipspruit coal would be exported via RBCT. As of BHP's 2009 report, Klipspruit held an Old Order Mining Right, with a New Order Mining Right application submitted in 2004, pending processing at the time. The project had environmental approval from the Mpumalanga Department of Agriculture, Conservation and Environment since 2003. Initial mining commenced in August 2003 through truck-and-shovel contractor methods. In June 2021, Seriti Resources officially acquired South 32's shareholding in SAEC, thereby taking full operational control of Klipspruit.

1.3 Location

Klipspruit is located approximately 4 kilometers west of Ogies in Mpumalanga Province, within the Nkangala District Municipality and the eMalahleni Local Municipality. The facility is bordered by the R555 provincial road to the south, the R545 provincial road to the east, and the N12 national road to the north (Refer to). This report focuses on Pollution Control Dam 4 (herein referred to as PCD 4), with its layout depicted in Figure 1-2.

Figure 1-1: Location of Klipspruit Coal Mine

Figure 1-2: Pollution Control dam 4 Layout



1.4 Dam Description

PCD 4 is designed to manage process water and stormwater runoff from the mine's open-cast coal operations. An inlet channel with a silt trap regulates water flow, allowing silts to settle before the water flows into the compartment. Table 1-1 provides a summary of PCD 4's characteristics based on measurements taken during the annual safety inspection.

Table 1-1: Dam Summary

Description	Value
Embankment type	Concrete dam
Maximum wall height	±5.5 m
Crest length	260 m
Crest width	5 m
Storage capacity at FSL	±137 500 m^3
Surface area at FSL	25 000 m^2
Lining parameters	Concrete lined
Water source	N/A
Dam use	N/A
Upstream Slope	Inner slopes 1V:3H
Downstream Slope	Outer slopes 1V:2.2H Erosion protection: 75 mm topsoil and vegetation
Outlet pipe	Five (5) No. 350 mm diameter steel pipe
Drainage System	A concrete seepage detector structure along the downstream toe of each compartment, filled with 13 mm crushed stone and a 100 mm slotted drainpipe
Outflow Spillway	Concrete Lined trapezoidal overbank spillway

2. OBJECTIVE

An annual dam safety evaluation was carried out in terms of Dam Safety Regulation no 139 of the National Water Act, 1998. The main purpose of the annual dam inspection is to assess the present condition of the retaining water dam and confirm its current state and suitability for continued operations. This report provides the record of the observations following the dam safety inspection as well as recommendations on improving the present condition of the dam.

3. EXCLUSIONS

The following tasks will not be carried out and documented as part of the dam safety evaluation:

- Design adequacy review
- Construction defects
- Risk Assessments in relation to the operation of the dam

4. INFORMATION

4.1 Information Available

Prior to the inspection of PCD 4, no detailed information regarding the dam's design, construction, operational history, or previous inspections was available. Consequently, this report represents the initial dam safety assessment and serves as a critical baseline for evaluating the dam's condition, structural integrity, and compliance with Department of Water and Sanitation (DWS) regulations. Observations and measurements recorded during the inspection, as summarized in Table 1-1, form the primary basis for this assessment. Future inspections are recommended to build on this baseline and incorporate additional data, such as design specifications or operational records, if they become available.

4.2 Information Not Available

The following information was not available prior to the publication of the inspection report:

- Emergency Response plan and Emergency Preparedness plan;
- Maintenance records;
- Daily Inspection sheets. Klipspruit Colliery Mine (Pty) Ltd;
- Klipspruit Colliery Pollution Control Dam Design and Construction Report;
- Klipspruit Colliery Pollution Control Dam Operation and Maintenance Manual;
- Construction design drawings;
- Previous inspection reports; and
- Pollution Control Dam Annual Dam Safety Inspection Report.

5. DAM INSPECTION

A site inspection of the dam was undertaken on the 26TH of March 2025 by the following personnel:

- Alvin Masarira (Professional Civil Engineer);
- Rifumu Mabasa (Civil Engineer);
- Katlego Molefe (Civil Engineer); and
- Neo Tamako (Civil Engineer).

The weather at the time of the inspection was 24 degrees Celsius. The dam water level was visually noted to be 20% full. The various components of the dam were inspected, and relevant observations were made and documented in the subsequent pages of this report.

5.1 Wall Embankment

Table 5-1: Wall Embankment Condition

No.	Indicator	Comments
1	Wall type	Concrete
2	Wall crest condition	Minor cracks observed
3	Visibility of erosion	None observed
4	Settlement	None observed
5	Seepage	None observed
6	Wall movement	None observed
7	Vegetation on wall (trees, shrubs)	Minor shrubs were observed on the crest of the dam
8	Holes (rats, ants, meerkats, moles, etc)	None observed
9	Grass condition	No concerns
10	Alterations on wall	None observed
11	Photo reference	Photo 1 to Photo 4 in **Error! Reference source not found.**

5.2 Dam Basin

Table 5-2: Dam Basin Condition

No.	Indicator	Comments
1	Dam basin	Excessive silt accumulation was observed inside the dam basin
2	Rip rap condition	No concerns
3	Photo reference	Photo 5 and Photo 6 in **Error! Reference source not found.**

5.3 Inlet

The inlet consists of two (2) UPVC 350mm Ø pipes that discharge water into the silt trap that directs the flow into the dam.

Table 5-3: Dam Inlet Condition

No.	Indicator	Comments
1	Pipe condition	No concerns
2	Water flow	Water quality report needs to be provided
3	Flow meter functionality	None observed
4	Photo reference	Photo 7 and Photo 10 in **Error! Reference source not found.**

5.4 Outlet

The outlet works are located west of the dam. The outlet works include five (5) 300mm Ø steel pipes that are connected to a suction at the inlet.

Table 5-4: Dam Outlet Condition

No.	Indicator	Comments
1	Leakages	No leakages detected
2	Pipe condition	No concerns
3	Valve condition	No concerns
4	Downstream erosion	None observed
5	Photo reference	Photo 11 and Photo 12 in **Error! Reference source not found.**

5.5 Spillway

The outflow spillway for PCD 4 is situated on the northern embankment wall and is designed as a trapezoidal-shaped concrete structure.

Table 5-5: Outflow Spillway Condition

No.	Indicator	Comments
1	Spillway type	Concrete
2	Erosion	None observed
3	Structure condition	No defects observed. The structure complies to GN704 legal requirements
4	Shrubs, trees, or reeds	Excessive reeds growth noted on the spillway
5	Blockages	None observed
6	Water flowing	No water overflow observed
7	Rip rap condition	No concerns
8	Downstream channel condition	No concerns
9	Culverts	None observed
10	Photo reference	Photo 13 to Photo 14 in **Error! Reference source not found.**

5.6 Safety and Security

Table 5-6: Safety and Security Condition

No.	Indicator	Comments
1	Fence condition	No concerns
2	Access roads	No concerns
3	Gate conditions	One of the gate entrances was open on the day of the inspection
4	Signage	Poor signage observed

5	Safety buoys condition	No safety netting or floating buoys were observed during the inspection. This must be verified against the Seriti safety standard
6	Fire breaks	No concerns
7	Emergency contact numbers	The emergency contact numbers were not visible
8	Emergency case	No emergency case observed
9	Photo reference	Photo 15 to Photo 18 in **Error! Reference source not found.**

6. RECOMMENDATIONS

Table 6-1 provides the details the recommendations for the current site inspection completed by Isithelo on the 26th of March 2025.

Table 6-1: Updated recommendations

Description	Recommendations	Photo reference
Vegetation	Stumps were observed on the crest of the dam from cut trees. The stumps should be treated to prevent root growth may impact the wall and stability of the dam	Photo 4
Crest	Lateral cracks were observed on the crest of the dam wall. The cracks need to be sealed	Photo 2
Safety nets	No safety netting or floating buoys were observed during the inspection. This must be verified against the Seriti safety standard	Photo 2, 5, 6, & 15
Dam basin	Excessive reeds and silt observed inside the dam basin. Removal of the reeds and silt is required to restore the dam to its full capacity	Photo 5 & 6
Silt trap	Excessive reed growth noted along the silt trap. The vegetation needs to be removed	Photo 9 & 10
Housekeeping	Heaps of silt were noted near the silt trap. The silt should be removed as it is placed directly in contact with the ground surface. In future silt placement should be on the concrete drying bed	Photo 17
Spillway	Excessive reed growth noted along the silt trap. The vegetation needs to be removed to restore the spillway to its full function	Photo 13
Inlet channel	Silt accumulation was noted inside the inlet channel. The silt needs to be cleaned to restore the channel's full function	Photo 7
Liner	No HDPE liner was observed in PCD 4. According to GN704 legal requirements, an HDPE liner is mandatory for compliance	Photo 2, 5, 6, & 15
Safety	No safety case was observed within the compartments of PCD 4. A safety case containing life jackets, a life buoy, and other required safety equipment is necessary for compliance	Photo 16 & 18

Safety	"No Entry" sign was not observed at the entrance. Adequate signage is required	Photo 16
Safety	The emergency numbers were not visible at the compartment. Adequate signage is required on the safety board	Photo 18
Documentation	No information was available or provided regarding PCD 4 prior to the inspection. Proper management and monitoring of the dam, along with effective documentation control and record-keeping, are required	N/A

APPENDICES - Site Inspection Photos

Photo 1: Wall crest condition  Satisfactory No concerns	**Photo 2:** Wall crest condition  Unsatisfactory Lateral cracks observed on the concrete

Photo 3: Grass condition  Note: Grass-cutting were carried out at the time of inspection	**Photo 4:** Vegetation  Unsatisfactory Vegetation noted on the inside and outside wall. The vegetation needs to be removed and treated

Dam Basin

Photo 5: Dam basin	**Photo 6:** Dam basin
	
Unsatisfactory Silt accumulation observed inside the dam basin	Unsatisfactory Reeds observed growing inside the dam basin

Inlet

Photo 7: Inlet channel	**Photo 8:** Inlet pipes
	
Unsatisfactory Silt accumulation inside the inlet channel leading to the silt trap	Note: Note the two uPVC pipes discharging inside the silt trap

Photo 9: Silt trap	**Photo 10:** Inlet channel
	
Unsatisfactory Excessive reeds observed inside the silt trap compartment	Unsatisfactory Excessive reeds observed inside the channel from silt trap compartment to the dam

Outlet Works

Photo 11: Flow meter

Satisfactory
Flow meter observed. The data should also be recorded and shared with Isithelo

Photo 12: Outlet works

Satisfactory
No concerns

Spillway

Photo 13: Overflow spillway

Unsatisfactory
Excessive reeds and vegetation growth along the spillway

Photo 14: Leakage detector

Satisfactory
No concerns

Safety and Security

Photo 15: Safety Buoy  Unsatisfactory No HDPE liner, safety nets, and safety bouys noted. This must be verified against the Seriti safety standard	**Photo 16:** Safety Signage  Unsatisfactory “No Entry” signage missing at the entrance. Additionally, one of the gates was not locked on the day of the inspection

Photo 17: Housekeeping	**Photo 18:** Safety equipment
	
Unsatisfactory Heaps of silt observed placed directly in contact with the ground	Unsatisfactory No emergency numbers observed at the compartment. Emergency numbers are required on the safety board. Additionally, there was no safet case observed

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www.isithelo.com Tel: +27 11 880 6338

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From exploration to mine closure our areas of specialization include geosciences, project engineering and integration, safety and sustainability, mining, drilling, and blasting, comprehensive engineering services and change management specific to improved operational performance.

Mining Explosives quality testing, REE and RBS, Initiation and accessories evaluation, Incident investigation ,On Bench practices / assessment ,Borehole tracking, X,Y,Z mapping, Blast Optimization. Mine design, mine planning, fleet sizing, equipment scheduling. Equipment OPEX Costing.

Materials Handling Department Belt Condition Monitoring, Design Reviews, Discrete Element Modelling of Flow, Dust Management, Equipment Monitoring, Instrumentation, Flow Properties Testing, Mechanical Conveyor Design, System Audits. Equipment Selection and Concept Studies.

Industrial Engineering Dynamic simulation modelling (processes), capacity evaluation and optimisation, time and motion studies, facility layout planning, Lean Six Sigma DMAIC and DMADV, operations analysis, financial modelling, design of experiments.

Materials Engineering Failures Investigations, Remaining Life Assessment, Materials of construction selections, Welding Inspections, reviews and Designs, Coating selections and specifications, Mechanical Testing, Corrosion studies, On Site inspections and assessments, NDT testing

Mechanical Engineering Structural FEA (Static/Dynamic/Explicit), Multi Body Dynamics, Metal Fatigue Analysis, Test and Measurement, Investigations/Design Reviews, Tyre Pyrolysis and Fatality Investigations

Asset Management and Fluid Handling Complete Physical Asset Lifecycle management of mining equipment and process plans, Design and design reviews across the whole mineral processing value chain, Design and design reviews of fluid handling systems – water, slurry, compressed air, Flow simulations.

Structural Engineering Structural Condition Assessment SIMM, Failure Investigations, Structural Static/Dynamic Design/Analysis, Structural Risk Assessment and Profiling, Structural Feasibility Studies, Development of Repair Methodology, Training.

Mineral Residue Tailings Project Review FEL1-FEL3; Oversight, Technical Assurance of Tailings Storage Facilities (TSF); Monitoring and Operational Control; Rehabilitation and Closure; Alignment with SANS 10286 best practice.

Quality Assurance Department ISO 9001 Implementation & Support, Project Quality (Stay In Business (Sib) & Capital Projects), Project QA (manufacturing & site),Supplier QA, Identify, Assess & Manage 3rd Party Inspection Companies, Technical Assessments on Suppliers, Training on auditing and site quality control

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Directors: Jose Prozzi
Company Registration Number: 2015/17148/07

Isithelo Mining Consultants and Services (Pty) Ltd
Queries : contact@isithelo.com
Contact : +27 84 833 1114
www.isithelo.com

Engineering | Quality | Geoscience | Mining | Minerals Residue
www.isithelo.com Tel: +27 11 880 6338

Klipspruit Colliery

KPS Extension Tip Wall Structures

Division of Seriti Power

STRUCTURAL INSPECTION AND MAINTANANCE MANAGEMENT

SIMM 2025 REPORT

Service | Safety | People

Isithelo Mining Consultants and Services (Pty) Ltd
345 Rivonia Blvd, Rivonia, Johannesburg, South Africa
www.isithelo.com

Report No

ITH 4743 -SERITI Klipspruit Extension Tip Wall Structure

Report Date: 27 May 2025

Report Title

Klipspruit Colliery- KPS ROM Plant: SIMM REPORT 2025

Client

Klipspruit Colliery – A Division of Seriti Coal

Distribution List

External

Francois Coetzee

Mias du Plessis

Internal

Author

AMasarira

……..

Alvin Masarira, PrEng, PhD

Principal Structural Engineer

EXECUTIVE SUMMARY

The general condition of the structures can be considered as good. There is no evidence of any significant deterioration. There is however water (mud) that accumulates in some areas, and this should be cleared away on a regular basis.

URGENT ITEMS

The urgency of the items is based on the risk rating and if safety critical findings and recommendations are mentioned thee require more urgent items.

LIMITATIONS

The report mainly focuses on areas of concern identified. Where there no visible concerns the report does not make mention of those areas even though there were inspected.

Isithelo Mining Consultants and Services (Pty) Ltd shall not be liable for any loss or damage of any kind (including consequential loss) suffered by any third party, however such loss or damage may have been caused or sustained.

The client, by acting on this report, accepts these terms and conditions, indemnified and holds Isithelo Mining Consultants and Services (Pty) Ltd harmless against all such loss or damage.

Document Control

Rev	**Date**	**Author**	**Description**
00	27 /05/2025	A Masarira	For information
01			
02			

Table of Contents

1. INTRODUCTION

Isithelo Technical Services was requested by Seriti Power to conduct a structural condition assessment at Klipspruit Colliery. The objective was to determine if there is any structural damage or deterioration that would pose a risk to the operations, in terms of safety, production or asset value.

The inspection was conducted on 15 May 2025 by Alvin Masarira and Rifumu Mabasa of Isithelo Technical Solutions.

The inspection was conducted in accordance with Seriti Standard AA_RP_000167 “SIMM Guidelines for Plant Structures” Vers. 3.1.

2. GENERAL

2.1 STRUCTURAL CONDITION CATEGORIES

Six conditions categories are used throughout this report to define the condition of plant structures. These are described in Table 2-1 below.

Table 2-1: Condition categories

Category	Description	% Original Strength	Typical Remedial Action
0	The plant structures are in excellent condition, with no deterioration evident. Safe use of the plant structures is assured.	100	None required
1	The plant structures have slight evidence of surface deterioration, but to an extent that there is no reduction in strength. Safe use of the plant structures is assured.	100	None required
2	The plant structures have some deterioration, to an extent that there is slight reduction in strength. Safe use of the plant structures is assured.	95 – 100	Repaint, tighten bolts, other minor work
3	The plant structures show deterioration, to an extent that there is some reduction in strength. There is some compromise to safe use of the plant structures. Repair must receive attention in maintenance scheduling.	75 – 95	Repaint, tighten bolts, other minor work
4	The plant structures 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 replacement of members
5	The plant structures 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 members required urgently

Table 2-2: Levels of Priority

Priority	Description
1	All members in condition category 5, any primary structural members in condition category 4, and any other members where the deterioration leads to a risk to personnel safety must be recorded as Priority 1. Repair or replacement of the structural members, or other recommended work, requires urgent, immediate attention.
2	All secondary or tertiary members in condition category 4, and any other structural members requiring repair or replacement in the short term must be recorded as Priority 2. Repair or replacement of the structural members, or other recommended work, should be scheduled as soon as possible, but not later than one year from date of this report.
3	Repair of the structural members, or other recommended work, will be required within the next three years.
M	Where some aspect of a structure must be specifically monitored to ascertain the rate of ongoing deterioration, this may be recorded as Priority M. This might apply for example, where loose bolts are encountered and it is not clear why they are loose, or whether are repeatedly loosening. It might also apply for example, where cracks are detected and the Structural Engineer finds it necessary to identify the rate of growth of the cracks.
X	Where a structure or portion of a structure cannot be used for its intended purpose in its current condition, but may not be required to be used for some time, it must be recorded as Priority X. This would typically apply to maintenance structures such as crawl beams. Repair or replacement of the structural members must be completed before use of the structure.

Table 2-2 describes the levels of priority (i.e. degree of urgency) in the implementation of the remedial action recommended.

Table 2-3 provides a risk rating matrix (5 X 5) - Structural Condition and Risk to Production for the structures reported on.

Table 2-4 provides the likelihood of occurrence (probability) and safety, health and environmental severity

Table 2-5 provides a risk evaluation.

Table 2-3: Structural Risk Rating (Structural Condition and Production Criticality)

		Structural Condition and Production Criticality					
Loss type		**0 None**	**1 Insignificant**	**2 Minor**	**3 Moderate**	**4 Major**	**5 Catastrophic**
Production		None	Minor disruption to production, less than 1 day loss or <0.5% loss in annual production	Minor disruption to production, less than 3 days loss or 0.5% -1% loss in annual production.	Partial shutdown, between 3 – 7 days loss or 1% - 2% loss in annual production	Partial loss of operation, 1-3 weeks loss or 2% - 6% loss in annual production	Substantial loss of operation, more than 3 weeks loss or > 6% loss in annual production
Structural Condition		**Risk Rating**					
Very Severe	**5**	0	**11**	**16**	**20**	**23**	**25**
Severe	**4**	0	**7**	**12**	**17**	**21**	**24**
Moderate Deterioration	**3**	0	**4**	**8**	**13**	**18**	**22**
Minor Deterioration	**2**	0	**2**	**5**	**9**	**14**	**19**
Good	**1**	0	**1**	**3**	**6**	**10**	**15**
Excellent	**0**	0	**0**	**0**	**0**	**0**	**0**

Table 2-4: Likelihood of Occurrence and Consequences

	Safety, Health and Environmental Severity/Consequence					
		1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
Safety	Level of Condition Deterioration ↓	First Aid Treatment Medical Treatment Injury	Lost Time Injury 1-13 Days (Reversible injury) RWI – Restricted Work Injury	Lost Time Injury >13 Days (Moderate irreversible injury)	Single fatality (permanent disability to one or more persons)	Multiple fatalities
Health		Irritation, nuisance, no medical treatment, inconvenience	Medium term largely reversible health effect (Recovery in less than 5 days)	Moderate reversible health effect (Recovery in more than 5 days)	Irreversible human health effect to one or more individuals	Significant irreversible human health effect to 10's of people
Environment		An incident that can cause negligible reversible environmental impact requiring very minor or no remediation	An incident that can cause minor reversible environmental impact requiring minor remediation	An incident that can cause moderate, reversible environmental impact with short term effect requiring moderate remediation	An incident that can cause serious environmental impact with medium term effect requiring significant remediation	Can cause disastrous environmental impact with long term effect requiring major remediation
Probability (Likelihood of Occurrence)						
>99%	**5**	**11**	**16**	**20**	**23**	**25**
>50% and <99%	**4**	**7**	**12**	**17**	**21**	**24**
>20% and <50%	**3**	**4**	**8**	**13**	**18**	**22**
>1% and <20%	**2**	**2**	**5**	**9**	**14**	**19**
1%	**1**	**1**	**3**	**6**	**10**	**15**

Table 2-5: Risk Evaluation

Risk Score	Risk Level		Acceptability of Risk	Recommended Actions
<5	**Low**		Acceptable	No additional risk control measures required. To continue to monitor to ensure risk do not escalate to higher level.
6-12	**Moderate**		Moderately Acceptable	Acceptable to carry out the work activity; however, task need to be reviewed to bring risk level to As Low As Reasonably Practicable. Interim control measures such as administrative controls can be implemented. Supervisory oversight required.
13-20	**Medium to High**		Cautiously decide on acceptability	Great caution must be taken in deciding whether the job can be carried out. Steps should be made as a matter of urgency to reduce the risk to at least medium risk level. Risk controls should not be overly dependent on personal protective equipment. Controls measures should focus on Elimination, substitution and engineering controls.
>20	**Very High**		Not Acceptable	Job must not be carried out until risk level is brought to at least medium risk level. Risk controls should not be overly dependent on personal protective equipment. Controls measures should focus on Elimination, substitution and engineering controls. Immediate Management intervention required to ensure risk being brought down to at least medium level before work can be commenced.

3. KPSX TIP WALL STRUCTURES

Fig.1: Grizzly Feeder

Structural Defect / Inspection Finding:
The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**14**

Regular condition inspections should be conducted to identify defects early.

Fig.2: Supports

Structural Defect / Inspection Finding:
Muddy water (mud) spilled on supports accelerate corrosion of steel and rebar.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Clean spillage regularly to avoid corrosion of steel members and ingress of water into concrete supports.

Fig.3: Retaining Wall

Structural Defect / Inspection Finding:
The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**14**

Regular condition inspections should be conducted to identify defects early.

Fig.4: Plinth Support

Structural Defect / Inspection Finding:
Muddy water (mud) spilled on supports accelerate corrosion of steel and rebar.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Clean spillage regularly to avoid corrosion of steel members and ingress of water into concrete supports.

Fig.5: Support Plinth

Structural Defect / Inspection Finding:
Muddy water (mud) spilled on supports accelerate corrosion of steel and rebar.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Clean spillage regularly to avoid corrosion of steel members and ingress of water into concrete supports.

Fig.6: Support Beam

Structural Defect / Inspection Finding:
The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

Fig.7: Grating

Structural Defect / Inspection Finding:
The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

Fig.8: Anchor

Structural Defect / Inspection Finding:
The structure is in good condition. No evidence of any deterioration. But there's no Safe Working Load marked

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**5**

Regular condition inspections should be conducted to identify defects early.

Fig.9: Grating

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

Fig.10: Grizzly Walls

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

Fig.11: Walkway

Structural Defect / Inspection Finding:

Spillage on grating and corrosion protection is peeling off.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Clear spillage regularly and prepare repaint exposed sections.

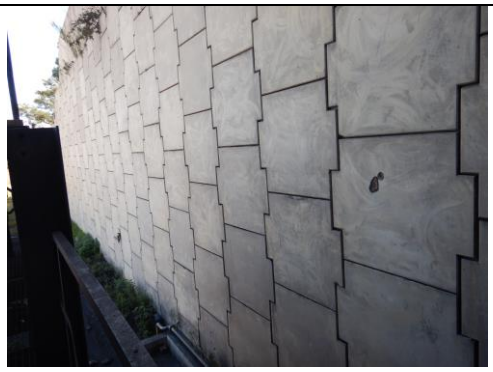

Fig.12: Retaining Wall

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**14**

Regular condition inspections should be conducted to identify defects early.

Fig.13: Retaining Wall

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**14**

Regular condition inspections should be conducted to identify defects early.

Fig.14: Walkway Support

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

Fig.15: Chute Wall

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

Fig.16: General

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

Fig.17: Walkway Support

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

Fig.18: Access ladder

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**3**

Regular condition inspections should be conducted to identify defects early.

Fig.19: Connection

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

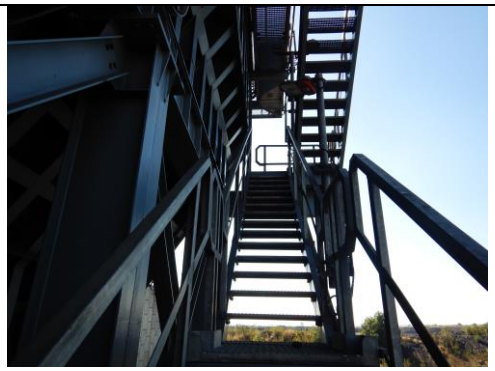

Fig.20: Staircase

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

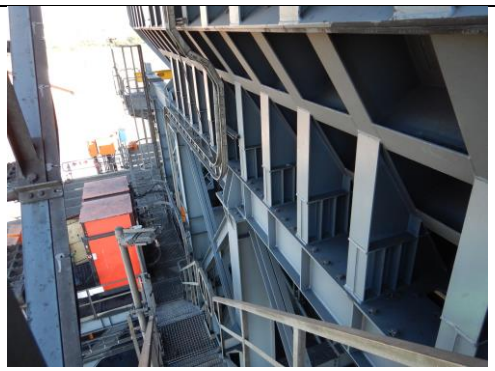

Fig.21: Grizzly Wall

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

Fig.22: Grizzly Grillage

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

Fig.23: Retaining Wall

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**14**

Regular condition inspections should be conducted to identify defects early.

Fig.24: General

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

Fig.25: Retaining Wall

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**14**

Regular condition inspections should be conducted to identify defects early.

Fig.26: Apron Feeder

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

Fig.27: Grizzly Walls

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

Fig.28: Support Beam

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

Fig.29: Support members

Structural Defect / Inspection Finding:
The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

Fig.30: Plinth Support

Structural Defect / Inspection Finding:
Muddy water (mud) spilled on supports accelerate corrosion of steel and rebar.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Clean spillage regularly to avoid corrosion of steel members and ingress of water into concrete supports.

Fig.31: Plinth Supports

Structural Defect / Inspection Finding:
Muddy water (mud) spilled on supports accelerate corrosion of steel and rebar.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Clean spillage regularly to avoid corrosion of steel members and ingress of water into concrete supports.

Fig.32: Support members

Structural Defect / Inspection Finding:
The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

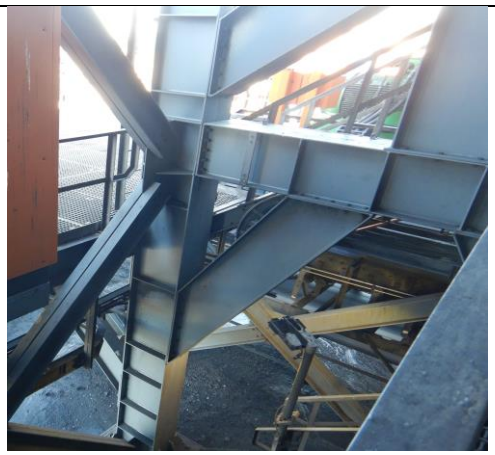

Fig.33: Support members

Structural Defect / Inspection Finding:

The structure is in good condition. No evidence of any deterioration.

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Regular condition inspections should be conducted to identify defects early.

Fig.34: Signage

Structural Defect / Inspection Finding:

N/A

Condition Category:		**Priority:**	
Recommendation:		**Risk Rating:**	

N/A

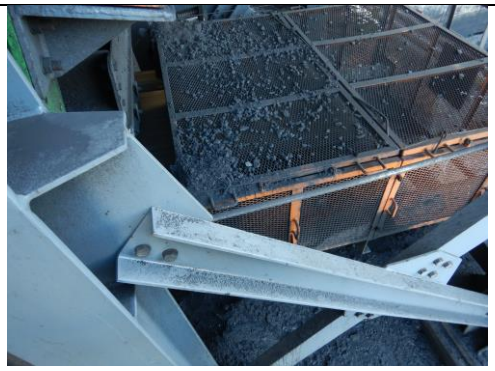

Fig.35: Screen

Structural Defect / Inspection Finding:

Excessive spillage on screen

Condition Category:	**2**	**Priority:**	**2**
Recommendation:		**Risk Rating:**	**9**

Clean spillage regularly to avoid overloading of the screen, which will lead to failure.

4. SUMMARY OF KEY FINDINGS AND RECOMMENDATIONS

The structural inspection did not identify any major defects, damage, or deterioration.

The structure is in a very good condition and there are no evident design errors.

There was no evidence of any structural modifications that were done to compromise the structural integrity of the plant.

There are however a few places where spillage is accumulating, and wet spillage leads to corrosion deterioration.

It is therefore recommended that spillage be cleared as often as possible.

APPENDIX A. GENERIC REMEDIAL WORK

1.1 GENERAL

An important aspect of the maintenance of any older building structure is repairing or replacement of damaged structural elements. This requires that due care is exercised, because structural integrity is critical to the safety of people and equipment in every building, and generally structures do not have redundant elements. Engineering Visual Structural Inspection Reports must always clearly specify what remedial work is required.

1.2 RECOMMENDATION FOR REMEDIAL WORK

Within the scope of a SIMM Inspection, recommendations will identify where structural members should be cleaned and repainted, repaired, or replaced. However, schemes for repair or replacement will generally not be provided. It is anticipated that the Client will place a further order for the Structural Engineering work required to specify the design and procedures for remedial work. However, there are certain general guidelines to be followed.

Removal or modification of structural elements can only be allowed under well-defined conditions. The most important condition is that in most cases it is necessary that any modification, repair, or replacement of a structural element must be specified and approved by a competent Structural Engineer. The following conditions apply to all remedial work recommended in SIMM reports:

a) All modifications should be specified by a competent Structural Engineer, but a concept may be proposed by the Plant personnel. All modifications must be approved by a competent Structural Engineer.
b) All repairs to damage in condition categories 4 and 5 should be specified by a competent Structural Engineer, but a concept may be proposed by the Plant personnel. All repairs to damage in condition categories 4 and 5 must be approved by a competent Structural Engineer.
c) Repairs to damage in condition categories 2 and 3 may be specified and carried out by the Plant personnel. Repairs to damage in condition categories 2 and 3 must be approved by the Plant Engineer.
d) Replacements may be carried out by the Plant personnel, provided the Plant Engineer approves the work and provided that all equipment, piping, flooring, tanks, etc supported by the structural

element(s) to be replaced is first removed. In all other cases, the procedure for replacement of structural elements should be specified by a competent Structural Engineer, but a concept may be proposed by the Plant personnel. The procedure for replacement must be approved by a competent Structural Engineer.

1.3 REPAIRS

The repairs allowed under item 1.2 (c) above, include the following procedures:

1.3.1 INSTALLATION OF WELDED COVER PLATES ON CORRODED SECTIONS

Cover plates may be welded over members which have corroded to the extent of corrosion category 3, 4 or 5, provided the following conditions are all satisfied:

a) Corrosion occurs in limited local areas only, not extending for more than 0,5m along the length of the member.
b) No deformation of the structure, or any structural members, has occurred. Where any of these conditions is not satisfied, a Structural Engineer must approve the repair procedure.

The repair using cover plates must adhere to the following requirements

1. Cover plates must extend to at least 300 mm over sound steel, where the corrosion condition category is 2 or better.
2. Cover plates must be at least as thick as the original member.
3. Wherever possible cover plates must be welded all around, using fillet welds with a leg size of at least half the plate thickness.
4. Wherever possible cover plates should be used on both sides of the members being repaired.
5. The original/existing member must be cleaned of dust and dirt with careful use of a wire brush before welding to ensure a good quality weld.

It is also possible to weld a new angle on the inside of an existing corroded angle. All the requirements specified for repairs using cover plates must be adhered to. In addition to this, the following requirements must also be met:

a) The new angle must be sized such that cross-sectional area of the new angle is at least 90% of the original cross-sectional area of the existing angle.

b) The new angle must also be sized such that the leg length of the new angle will allow sufficient space to run a continuous fillet weld along the toe of the new angle. As a general consequence of this note and note (a) above, the new angle will have a shorter leg length but a greater thickness than the original angle.
c) The heel of the new angle must be ground down so that it sits flush inside the existing angle. In other words, the heel must accommodate the root radius of the existing angle.
d) Wherever possible, the new angle must be welded onto the existing angle all around, using fillet welds with a leg size of at least half the plate thickness.

1.3.2 BOLTS

Loose, damaged or missing bolts may be tightened or replaced by Plant personnel. The following precautions must be taken:

a) No more than one bolt shall be removed from one connection at a time. The bolt shall be removed, and replaced immediately by a new bolt, which shall be tightened properly before the next bolt is removed.
b) Where there are only two bolts in a connection, the load on the connection shall be minimised before the bolt is removed. To minimise the load, it is necessary to ensure that bins are empty, floors are clear of stored material, equipment and people, and no more than a light wind is blowing.

1.3.3 REPAIR OF CUT-OUTS

Where cut-outs have been made in otherwise sound steel, they must be repaired using plate the same thickness as the steel member that has been cut. A piece of plate must be cut to fit into the cut-out, and must be prepared around its edges to allow it to be butt welded into position

1.3.4 REPAIR OF DAMAGED FLANGES

Note: This is not part of the SIMM guidelines but has been included to facilitate the repair work for the bent flanges noted in this report.

Where a flange has been bent, it should be bent back to its original position. The repair work should then be carried out in accordance with the procedures specified for the installation of welded cover

plates on corroded members. In this case though, instead of the extent of the damaged area being identifiable by the corrosion, it will be equal to the extent of the localized bent area.

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www.isithelo.com Tel: +27 11 772 1610

Directors: Jose Prozzi,

Company Registration Number: 2015/17148/07

Isithelo Mining Consultants and Services (Pty) Ltd

Queries: contact@isithelo.com

Contact: +27 10 880 6338

www.isithelo.com