



REPORT

**Regulatory Process for Additional Infrastructure for the
Modikwa Platinum Mine - Closure Planning and Costing
aligned to the NEMA Financial Provisioning Regulations
(GN.R. 1147)**

Modikwa Platinum Mine (Pty) Ltd

Submitted to:

Mpho Mokone

Modikwa Platinum Mine
Steelpoort Region, Onverwacht 293 KT Farm
Portion 0 (Remaining Extent)

Submitted by:

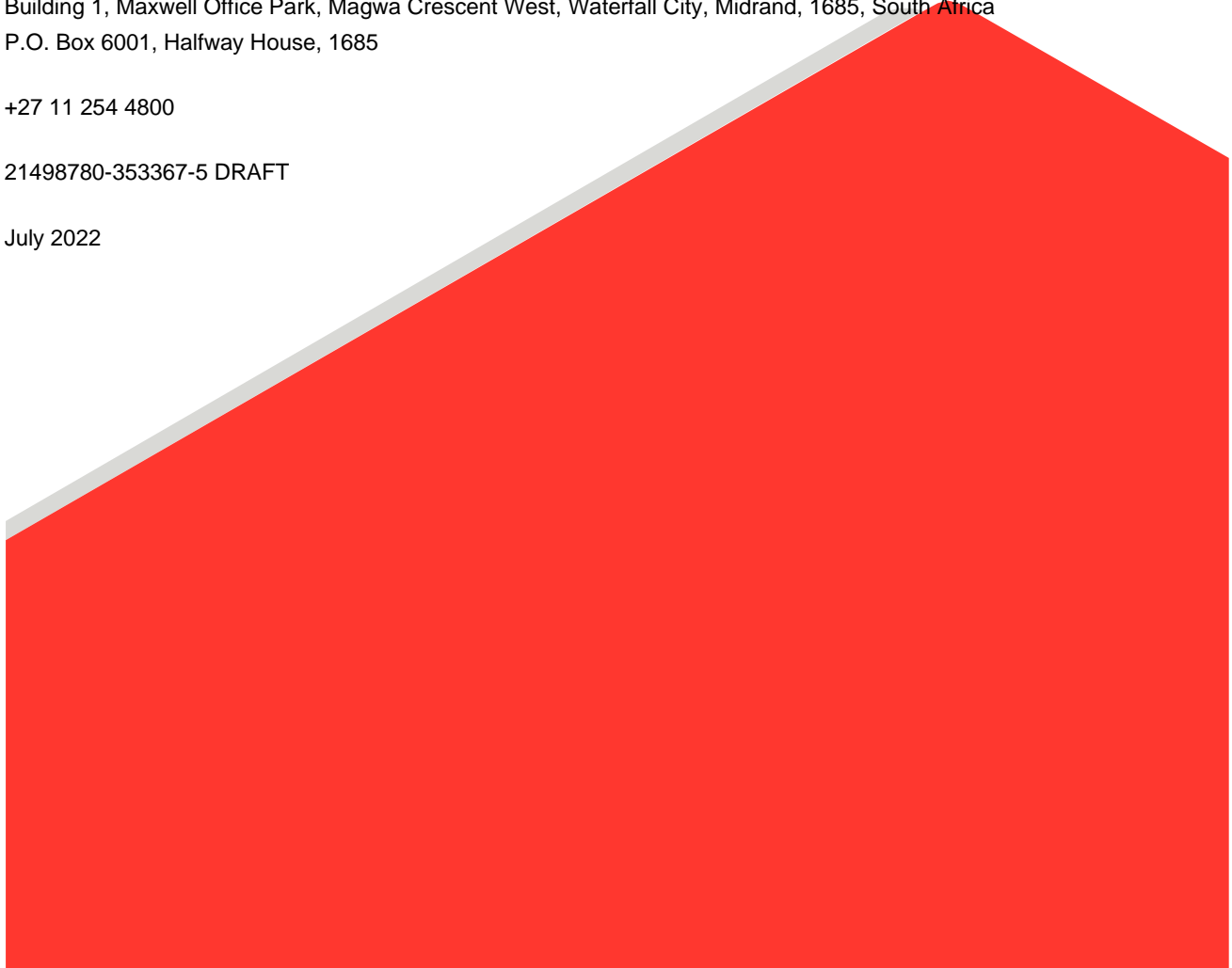
Golder Associates Africa (Pty) Ltd.

Building 1, Maxwell Office Park, Magwa Crescent West, Waterfall City, Midrand, 1685, South Africa
P.O. Box 6001, Halfway House, 1685

+27 11 254 4800

21498780-353367-5 DRAFT

July 2022



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1 x eCopy Modikwa Platinum Mine

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Table of Contents

1.0 INTRODUCTION AND BACKGROUND.....3

 1.1 Purpose of the report3

2.0 FINANCIAL PROVISION6

 2.1 Approach to cost determination6

 2.2 Battery limits.....6

 2.3 Rehabilitation objectives6

 2.4 Rehabilitation plan.....7

 2.5 Rehabilitation performance monitoring10

 2.5.1 Demonstration period.....10

 2.5.2 Baseline environmental site performance assessment10

 2.5.3 Monitoring and corrective action.....10

 2.5.4 Final site performance assessment.....10

 2.6 Closure measures10

 2.7 Closure cost determination11

 2.7.1 Unit rates.....11

 2.8 Assumptions and qualifications.....12

 2.8.1 Closure cost summary12

 2.9 Conclusion13

TABLES

Table 1: Details of specialist.....2

Table 2: Battery limits applicable to the closure cost determination6

Table 3: Performance objectives and associated measures.....8

Table 4: Closure measures11

FIGURES

Figure 1: Locality map (*Golder, 2022a*).....4

Figure 2: Aerial imagery of proposed roads (*Golder, 2022b*).....5

APPENDICES

APPENDIX A Document Limitations

ACRONYMS AND ABBREVIATIONS

Acronyms and abbreviations	Explanation
ARM	African Rainbow Minerals
BA	Basic Assessment
EA	Environmental Authorisations
LoM	Life of Mine
MPM	Modikwa Platinum Mine (Pty) Ltd
MR	Mining Right
MRC	Mining Right Converted
P&Gs	Preliminary & General
VAT	Value Added Tax

DETAILS OF THE SPECIALIST

Table 1: Details of specialist

Specialist Information	
Name:	Deshree Pillay
Cell phone number:	011 254 4836
Email:	deshree.pillay@wsp.com
Qualifications:	MSc (Env & Soc) Pr.Sci Nat Reg. EAP (EAPASA)
Specialist Information	
Name:	Johan Bothma
Cell phone number:	011 254 4839
Email:	johan.bothma@wsp.com
Qualifications:	MLArch PrLArch (SACLAP)

Declaration of Independence by Specialist

We, Deshree Pillay and Johan Bothma, declare that we –

- Act as the independent specialists for the undertaking of a specialist section for the proposed Modikwa Platinum Mine (Pty) Ltd Basic Assessment regulatory process for additional infrastructure
- Do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed
- Do not have nor will have a vested interest in the proposed activity proceeding
- Have no, and will not engage in, conflicting interests in the undertaking of the activity and
- Undertake to disclose, to the competent authority, any information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan, or document

1.0 INTRODUCTION AND BACKGROUND

Modikwa Platinum Mine (Pty) Ltd (MPM), an unincorporated joint venture between Rustenburg Platinum Mines Limited and African Rainbow Minerals (ARM) Mining Consortium Limited, is located 15 km north of Burgersfort and 15 km east of Steelpoort, in the Limpopo Province (Figure 1). MPM was issued a Mining Right (MR)(Original RoD Reference number: 6/2/2/477 and LP129MRC) and commenced with mining activities in 2001, with underground and open pit operations subsequently commencing in June 2010. The expected Life of Mine (LoM) for MPM is 2043. MPM has existing approved Environmental Authorisations (EA) in place for the north and south ventilations shafts. However, access roads to the ventilation shafts were not considered in previous applications and therefore forms the focus of this application.

MPM proposes the construction of two access roads that link to the approved north and south (Merensky) ventilation shafts which triggers a Basic Assessment (BA) process. The two proposed access roads are located within MPM's existing mining area. The proposed access road to the north ventilation shaft will be joined to an existing community road while the proposed access road to the south (Merensky) ventilation shaft will join to the existing Merensky south shaft operations. Road 1 (north ventilation shaft) will be approximately 308 m in length, 6 m in width (3 m either side of the centre line) and requiring an area of approximately 2464 m² to be cleared. Road 2 (south ventilation shaft) will be approximately 198 m in length, 6 m in width (3 m either side of the centre line) and requiring an area of approximately 1586 m² to be cleared. Refer to Figure 2 for an aerial image of the proposed access roads.

1.1 Purpose of the report

This report presents the **closure input** to the BA process, for the construction of two access roads at MPM. This report only summarises information that is pertinent to the BA process and does not replace the on-going closure planning processes that are conducted by the mine.

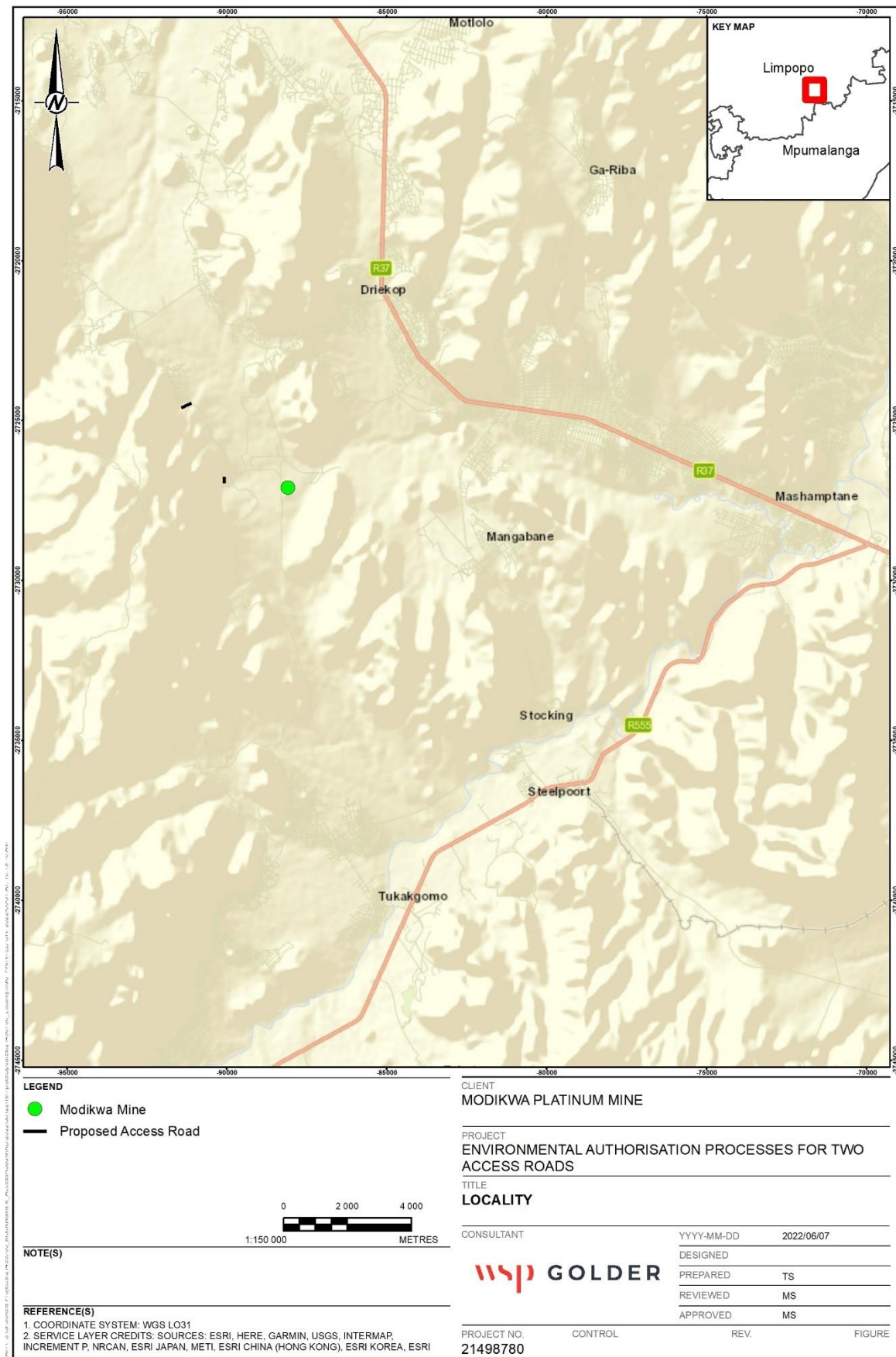


Figure 1: Locality map (Golder, 2022a)



Figure 2: Aerial imagery of proposed roads (Golder, 2022b)

2.0 FINANCIAL PROVISION

2.1 Approach to cost determination

The desktop approach followed to determine the closure cost estimate is summarised as follows:

- Review relevant supporting information, technical work and other relevant data made available that could inform the costing Identify appropriate measures for demolishing the roads and rehabilitating the associated disturbed footprint, including conducting required maintenance and aftercare
- Verify the unit rates for surface rehabilitation in consultation with earthwork practitioners
- Apply the above unit rates and associated quantities in Golder’s latest closure costing model
- Apply the specific provisions for post-closure monitoring and aftercare-related matters
- Compile a succinct memo to reflect the computed closure costs, the approach followed, and assumptions made in the closure cost determination

2.2 Battery limits

The battery limits for MPM’s proposed roads, as applied to the closure cost determination, are listed in Table 2

Table 2: Battery limits applicable to the closure cost determination

Area	Closure components
Infrastructure areas	<ul style="list-style-type: none"> ■ Road 1 (north ventilation shaft) ■ Road 2 (south ventilation shaft)

2.3 Rehabilitation objectives

The key rehabilitation objectives for the proposed access roads are as follows:

- **Physical stability:** to rehabilitate the proposed access roads and integrate these with the surrounding topography so that all landforms are stable and are able to accommodate a 1:50 year flood event
- **Environmental quality:** to ensure that local environmental quality is not adversely affected by possible physical impacts
- **Health and safety:** to limit the possible health and safety threats to humans and animals using the rehabilitated site
- **Land capability/land-use:** to establish land capability of grazing and wilderness over the site as far as possible, by limiting the loss of soil resources during earthworks and contamination/spillage clean-up (if required)
- **Landscape viability and biodiversity:** to create a grassland and/or pasture that is largely self-sustaining post-closure
- **Aesthetic quality:** to leave behind a rehabilitated site that, in general, is not only neat and tidy, giving an appropriate overall aesthetic appearance, but which in terms of this attribute is also aligned to the end land use

- **Socio-economic:** to engage with communities with respect to the end land use of the rehabilitated site, agreeing on long term land management practices in order to limit possible degradation of the site to ensure sustainability of resources provided over the long term

2.4 Rehabilitation plan

- Site preparation
- Demolition of infrastructure and clean-up of contamination (if required)
- Shaping and levelling to facilitate drainage
- Seeding and care and maintenance

Rehabilitation performance objectives, rehabilitation measures, assignment of responsibilities and scheduling for the above rehabilitation components are provided in Table 3.

Rehabilitation performance monitoring and associated care and maintenance (aftercare/corrective action) are provided in Section 2.5.3.

Table 3: Performance objectives and associated measures

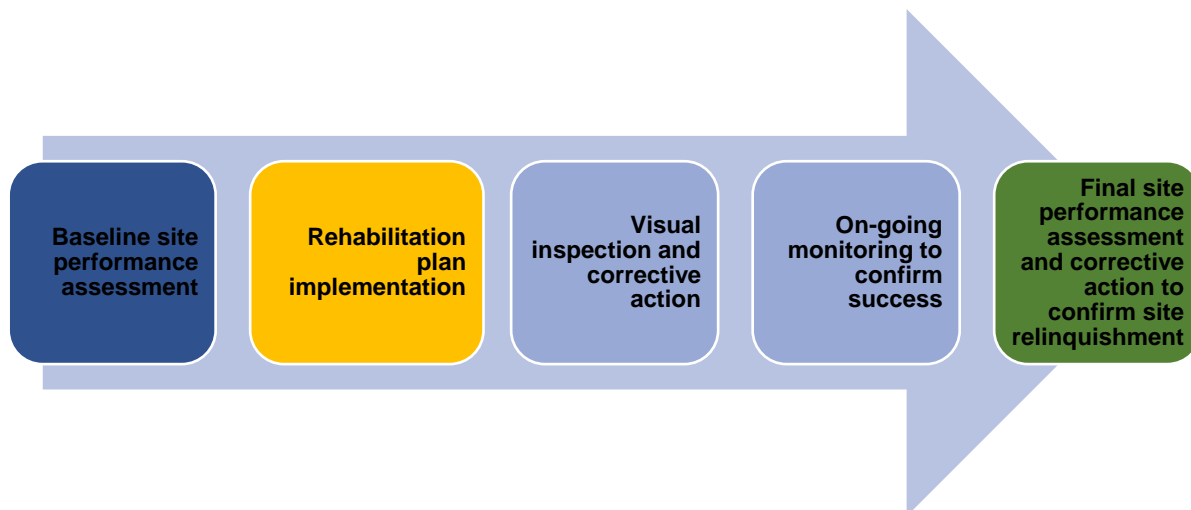
Rehabilitation performance objectives	Measures/actions	Responsibility	Scheduling
Site preparation			
<ul style="list-style-type: none"> ■ Unauthorised access to the site restricted during rehabilitation and post rehabilitation 	<p>Site preparation Following tender letting and award, the elected rehabilitation contractor will establish and take-over responsibility of the site. The specific requirements for site establishment would be prescribed by the tender contract, but would address at least the following aspects:</p> <ul style="list-style-type: none"> ■ Erect a stock fence with an access gate along the dirt road to prevent the area from being accessed while vegetation is being established, and also to prevent uncontrolled access to the rehabilitated site ■ If a temporary laydown or equipment storage area is required for contractor use, restrict the storage area to redundant portions of the access road ■ The contractor is to supply electricity and water reticulation, if required, at its own cost 	Contractor	Winter
Demolition of infrastructure and removal of contamination			
<p>In terms of structures and localised contaminated areas attaining the following:</p> <ul style="list-style-type: none"> ■ No substantive visible general waste and remnant concrete rubble ■ Appropriate handling and disposal of wastes 	<p>Proposed access roads</p> <ul style="list-style-type: none"> ■ Rip and shape footprint area to be free-draining, aligned to site-wide runoff routing ■ Establish vegetation by applying suitable seed mix 	Contractor	Winter
Shaping and levelling			

Rehabilitation performance objectives	Measures/actions	Responsibility	Scheduling
<p>Site shaping and levelling will be conducted to attain the following:</p> <ul style="list-style-type: none"> ■ No ponding over the shaped and levelled surface ■ Stormwater system able to accommodate 1:50 year flood events without significant erosion 	<p>Existing stormwater drains</p> <ul style="list-style-type: none"> ■ Shape and profile the disturbed areas from which plant and related infrastructure have been removed to a maximum slope of 1:7 and to be free draining ■ Rip the site before vegetation establishment to approximately 500 mm depth to alleviate compaction 	<p>Contractor</p>	<p>Ideally the ripping will be done in autumn, as the summer rains would have softened the soil profile to allow effective ripping, without excessive soil moisture content. Alternatively, shaping and levelling can be done during winter or early spring</p>
Seeding and maintenance			
<p>Re-vegetating the disturbed and re-profiled portions of the site, to achieve the following:</p> <ul style="list-style-type: none"> ■ A seedbed suitable for grass seeds to germinate ■ Selected vegetation species to combat erosion ■ Seed mix suitable to withstand well drained as well as seasonally wet conditions ■ Control invasive/exotic species 	<p>Seeding</p> <ul style="list-style-type: none"> ■ Use a standard agricultural seed drill (preferable) or seed spreader to sow the seed mix on all the prepared areas. Where a spreader is used the seeded areas should be lightly rolled to improve the contact between the soil and seed, and also to prevent seed loss (usually by wind, rain, insects or birds) ■ Conduct a visual inspection to confirm seed (nurse crop) establishment has been successful and any germination or establishment failures (through poor seed quality, seed application, drought etc.) are noted 	<p>Contractor</p>	<p>After spring rains that sufficiently dampened the upper profile of the soil layers so that the measured soil moisture content is 6% - 10% at 500 mm depth</p>

2.5 Rehabilitation performance monitoring

2.5.1 Demonstration period

It is envisaged that a three-year demonstration period will be required to confirm success of rehabilitation. Following the completion of earthworks and vegetation establishment a visual inspection will be undertaken to inform corrective action required, if needed. Thereafter ongoing monitoring and corrective action will be undertaken.



2.5.2 Baseline environmental site performance assessment

A baseline site performance assessment (largely based on existing information and supplemented by a dedicated site walkover) must be conducted prior to rehabilitation implementation. The aim of the environmental site performance assessment is to establish the status quo/baseline and knowledge base against which results of monitoring conducted after rehabilitation will be measured. Additionally, a site performance assessment could be a requirement as part of environmental permitting for decommissioning of the site in terms of the provisions of NEMA.

2.5.3 Monitoring and corrective action

The rehabilitation performance/progress will be documented in a dedicated bi-annual rehabilitation performance report to be submitted to MPM, until abandonment criteria are met. The report should reflect on the outcome of monitoring undertaken, rehabilitation performance and corrective action required.

2.5.4 Final site performance assessment

Following completion of rehabilitation and/or the demonstration period of three years a final performance assessment should be undertaken to document the success of rehabilitation and the corrective action undertaken. The final site performance assessment will be used to document the success of rehabilitation for record keeping.

2.6 Closure measures

The closure costs are based on the closure measures developed for MPM's proposed pipeline, as outlined in Table 4

Table 4: Closure measures

Aspect	Closure Measures
Infrastructural areas	
Roads	<ul style="list-style-type: none"> ■ Rip and shape footprint area to be free-draining, aligned to site-wide runoff routing ■ Establish vegetation by applying suitable seed mix
General surface rehabilitation	
Shaping, ripping and vegetation establishment	<ul style="list-style-type: none"> ■ Shape and level overall disturbed area to be free ■ Rip footprint area to be free draining ■ Establish vegetation using a suitable indigenous seed mix
Post-closure aspects	
Rehabilitation monitoring	<ul style="list-style-type: none"> ■ Conduct rehabilitation monitoring over the rehabilitated area for a period of ten years post-closure
Care and maintenance	<ul style="list-style-type: none"> ■ Undertake care and maintenance over the rehabilitated area for a period of ten years post-closure
Post-closure aspects	
Preliminary and general	<ul style="list-style-type: none"> ■ Additional allowance of 25% of the total for Infrastructural and related aspects (sub-total 1 on summary costing table) has been made
Contingencies	<ul style="list-style-type: none"> ■ Additional allowance of 10% of the total for Infrastructure and related aspects (sub-total 1 on summary costing table) has been made

2.7 Closure cost determination

2.7.1 Unit rates

The unit rates for general rehabilitation and closure measures/activities were obtained from Golder's existing closure costing database, which is regularly updated in consultation with demolition and earthworks contractors, as well as with rehabilitation practitioners. Golder undertakes a thorough review of its unit rate database, as follows:

- Minor unit rates are adjusted with standard inflation at least once a year
- Key rates for the dismantling of infrastructure are benchmarked at least annually by a specialised demolition contractor, to ensure that they remain market-related and take account of the latest dismantling and

demolition techniques. It is noted that as these technologies improve, these rates in real terms are trending downwards

- Earthworks rates are benchmarked against recent tenders available to Golder as well as benchmarking in discussion with contractors
- Aggregated rates dependent on base infrastructure or earthworks-related rates are recalculated given the latest base rates

2.8 Assumptions and qualifications

To determine the closure cost estimate for MPM's proposed pipeline, Golder made use of the following key assumptions:

- The proposed access roads will be removed and rehabilitated at mine closure
- General surface rehabilitation will involve the shaping and ripping of the surface topography, to allow for a free-draining uncompacted surface, followed by vegetation establishment
- Rehabilitation monitoring and care and maintenance has been allowed for a period of ten years over the rehabilitated footprint area
- Fixed ratios for preliminary and general costs (25%) and contingencies (10%) have been applied
- No financial discounting of longer terms activities, for example care and maintenance, have been applied

2.8.1 Closure cost summary

The total estimated scheduled closure costs for MPM's proposed access roads, as at June 2022, amount to R84,205.22 (including P&Gs and contingencies and excluding VAT). These costs assume third-party contractor rates will be applied to decommissioning and rehabilitation of the road.

	Closure component	Real Financial Closure Obligation	
1	Infrastructural Aspects	R	38,741.54
2	Mining Areas	R	-
3	General Surface Rehabilitation	R	10,400.90
4	Surface Runoff Measures	R	2,881.45
	Sub-Total 1	R	52,023.88
5	Post-closure Aspects		
5.1	Monitoring and aftercare		
	Surface water Monitoring (5/yr)	R	-
	Groundwater Monitoring (5/yr)	R	-
	Rehabilitation monitoring (10yr)	R	2,126.74
	Care and maintenance - low intensity (10/yr)	R	11,846.25
	Sub-Total 2	R	13,972.99
7	Post-Closure Aspects		
7.1	Post Closure Aspects		
	Additional studies	R	-
7.2	Water Treatment (NVP)	R	-
	Sub-Total 3	R	-
	Total (Excl. P&Gs) Excl. VAT. (Sub-total 1 + 2 + 3)	R	65,996.87
6	P&Gs, Contingencies and Additional Allowances		

	Closure component	Real Financial Closure Obligation	
6.1	Preliminary and General (25%)	R	13,005.97
6.2	Contingencies (10%)	R	5,202.39
6.3	Provisional amount for Closure Related Social Aspects (2%)	R	-
	Sub-Total 4	R	18,208.36
	Total (Incl. P&Gs) Excl. VAT. (Sub-total 1 + 2 + 3 + 4)	R	84,205.22
	Grand Total Incl. VAT. @ 15% (Sub-total 1 + 2 + 3 + 4)	R	96,836.01

2.9 Conclusion

The closure costs reflected in this report were based on information provided by MPM. In those cases where the required information was not available, estimates were made based on Golder's experience in closure cost estimations. Unit rates for the costing were obtained from Golder's database. The reflected costs provide a good indication of the closure costs pertaining to the proposed access roads as at June 2022, providing a sound basis for making the required financial provision.

Golder Associates Africa (Pty) Ltd.

Deshree Pillay
Land use and closure consultant

Rochelle Bloemhof
Land use and closure consultant

DP/RB/nbh

Reg. No. 2002/007104/07

Directors: RGM Heath, MQ Mokulubete, MC Mazibuko (Mondli Colbert), GYW Ngoma

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APPENDIX A

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