



REPORT NO:
054 Kalgold Project Closure
Assessment Report – 2021_Rev2



MineLock
Environmental Engineers

Closure and Financial Provision
Assessment for Harmony Gold
Kalgold Mine, using the DMR
Guidelines as of November 2021

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1. INTRODUCTION

1.1 Background

Kalgold mine is an open pit mining operation located some 60km South West of Mahikeng in the North West Province. The mine is owned and operated by Harmony Gold, who acquired the mine in 1999. The mine is located in the Kraaipan Greenstone Belt, which is part of the large Amalia-Kraaipan Greenstone terrain. The largest ore body is found in the D-Zone, which was mined out by a single pit operation along a strike length of 1 300m and to a depth of approximately 290m below surface. Mining at Kalgold Mine continued at the A-Zone, Windmill and Watertank Open Pits, which are all relatively new opencast operations.

Digby Wells Environmental (Digby Wells) reviewed and updated the Closure Cost Assessment (CCA) for Kalgold in June 2021 (Digby Wells and Associates (South Africa) (Pty) Ltd, June 2021), using the Department of Mineral Resources and Energy (DMRE) guidelines set out by the DMRE (2005) in the “Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine” (Department of Mineral Resources, 2005). However, the costing was refined for the mine/operation and its specific considerations which in essence considered contractors rates but only caters for the unscheduled scenario.

The Kalgold operation wishes to expand its current production from the current production rate of 130 000 tons per month to 300 000 tons per month. A pre-feasibility study was recently completed and several expansions and relocations of existing facilities, new roads, a new plant, a new ROM pad, pipelines, water treatment plant etc.

MineLock Environmental Engineers (Pty) Ltd (MineLock) was commissioned by Environmental Impact Management Services (Pty) Ltd (EIMS) to assist with the CCA of the expansion project. The CCA method is based on the Department of Mineral Resources and Energy (DMRE) guidelines set out by the DMRE (2005) in the “Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine” (Department of Mineral Resources, 2005).

Since the expansion project has not commenced at the time that this report was written, allowance was made for a provision considering the first year of disturbance after the commencement of the project.

2. MINE OVERVIEW

Kalgold mine is an open pit mining operation located some 60km South West of Mahikeng in the North West Province.

This report only focusses on the planned expansion of the mining area which includes the following:

- New roads
- New processing plant
- New ROM pad
- Relocation of explosive magazine

Table 1 presents the infrastructure and features associated with the expansion of Kalgold mine.

Table 1: Activities as per DMR Guidelines

Component	Description	Applicable
1	Dismantling of processing plant and related structures (incl. overland conveyors and Power lines)	Structures at processing plant Car ports Paved areas Tanks Conveyors
2 (A)	Demolition of steel buildings and structures	Steel buildings and structures assumed to be at the processing plant and waste water treatment works
2 (B)	Demolition of reinforced concrete buildings and structures	Concrete structures assumed to be at the processing plant, waste water treatment plant and explosive magazine
3	Rehabilitation of access roads	Access roads
4 (A)	Demolition and rehabilitation of electrified railway lines	N/A
4 (B)	Demolition and rehabilitation of non-electrified railway lines	N/A
5	Demolition of housing and/or administration facilities	Brick buildings
6	Opencast rehabilitation including final voids and ramps	N/A
7	Sealing of shafts, adits and inclines	N/A
8 (A)	Rehabilitation of overburden and spoils	N/A
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt producing waste)	Plant Pollution control dam
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	N/A
9	Rehabilitation of subsided areas	N/A
10	General surface rehabilitation	Plant area and ROM footprint
11	River diversions	N/A
12	Fencing	Perimeter fences at processing plant and explosive magazine
13	Water management	N/A
14	2 to 3 years of maintenance and aftercare	All disturbed areas

3. INFORMATION RECEIVED

The following information was received, which the DMR costing was based on:

- Google Earth file (Layout.kml)
- Previous completed closure costing on existing infrastructure (Report no HAR6930_NW77MR_CCA_2021)
- General surface plan pdf (Kalgold General Surface Plan (2020.08.07))
- Draft Hydrological Assessment of the Harmony Kalgold Expansion Project (Report no EIM-005)
- Updated CAD shape file (20211202 Layout layers)

4. ASSUMPTIONS AND EXCLUSIONS

The following assumptions and exclusions have been made:

- All existing infrastructure was excluded from the closure costing;
- All infrastructure below ground (ie. Pipelines underground) have been excluded from the closure costing as stated in the DMR Guideline;
- It is assumed that the areas and delineations in the provided Google Earth files are correct and according to the planned expansion;
- All roads are assumed to be 8 meters wide;
- The client confirmed on 24 January 2022 that only half of the infrastructure will be constructed in the first year of mining/disturbance of the expansion project. Thus, the infrastructure within the new processing plant was assumed to be approximately half the size of the existing processing plant;
- The relocated explosive magazine was assumed to have the same infrastructure as the existing explosive magazine;
- Assume that existing tailings facility is recommissioned, however the footprint will not expand. All additional tailings will be deposited in the pits and no rehabilitation measures was accounted; and
- Assume ROM pad area will only have residue to be cleaned from the surface and that all other infrastructure has been removed before closure.

5. CLOSURE COST ASSESSMENT

This section presents the basis of the calculation of the quantum for financial provisions for closure. The assessment and calculations are based on the 2005 DMR 'Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision' provided by a Mine (Department of Mineral Resources, 2005).

5.1 Input parameters for quantum provision

No	Input data
1	Risk ranking for mine type and mineral by-product
2	Environmental sensitivity of the mining area
3	Level of information available
4	Type of mining operation
5	Geographical location of the mine
6	Closure components & Areas of disturbance (Components Map)

5.2 Primary Risk Class for type of minerals mined

Mineral	Ore	Size: Larger if > than (tpm)	Primary risk class			
			Large Mine		Small Mine	
			Mine and mine waste	Mine, mine waste, plant and plant waste	Mine and mine waste	Mine, mine waste, plant and plant waste
Gold		10 000	B	A	B	A

5.3 Risk Class

Determine risk class	
Class A	a high probability of the occurrence of the impact with a severe consequence,
Class B	a moderate probability of occurrence of the impact with a manageable consequence,
Class C	a low probability of occurrence of the impact with a negligible consequence.

5.4 Area Sensitivity

Area sensitivity			
Sensitivity	Sensitivity criteria		
	Biophysical	Social	Economic
Low	<ul style="list-style-type: none"> • Largely disturbed from natural state. • Limited natural fauna and flora remains. • Exotic plant species evident. • Unplanned development. • Water resources disturbed and impaired. 	<ul style="list-style-type: none"> • The local communities are not within sighting distance of the mining operation. • Lightly inhabited area (rural). 	<ul style="list-style-type: none"> • The area is insensitive to development. • The area is not a major source of income to the local communities.
Medium	<ul style="list-style-type: none"> • Mix of natural and exotic fauna and flora. • Development is a mix of disturbed and undisturbed areas, within an overall planned framework. • Water resources are well controlled. 	<ul style="list-style-type: none"> • The local communities are in the proximity of the mining operation (within sighting distance). • Peri-urban area with density aligned with a development framework. • Area developed with an established 	<ul style="list-style-type: none"> • The area has a balanced economic development where a degree of income for the local communities is derived from the area. • The economic activity could be influenced by indiscriminate development.
High	<ul style="list-style-type: none"> • Largely in natural state. • Vibrant fauna and flora, with species diversity and abundance matching the nature of the area. • Well planned development. • Area forms part of an overall ecological regime of conservation value. • Water resources emulate their original state. 	<ul style="list-style-type: none"> • The local communities are in close proximity of the mining operation (on the boundary of the mine). • Densely inhabited area (urban/dense settlements). • Developed and well-established communities. 	<ul style="list-style-type: none"> • The local communities derive the bulk of their income directly from the area. • The area is sensitive to development that could compromise the existing economic activity.

5.5 Closure components

The table below lists the closure components and identifies the components that will be applicable for this mine.

Component No.	Main description	Applicable closure components for mine type		
		Open-cast	Under ground	Combination
1	Dismantling of processing plant and related structures (including overland conveyors and power lines)	Yes	Yes	Yes
2(A)	Demolition of steel buildings and structures	Yes	Yes	Yes
2(B)	Demolition of reinforced concrete buildings and structures	Yes	Yes	Yes
3	Rehabilitation of access roads	Yes	Yes	Yes
4(A)	Demolition and rehabilitation of electrified railway lines	Yes	Yes	Yes
4(B)	Demolition and rehabilitation of non-electrified railway lines	Yes	Yes	Yes
5	Demolition of housing and facilities	Yes	Yes	Yes
6	Opencast rehabilitation including final voids and ramps	Yes	No	Yes
7	Sealing of shafts, adits and inclines	No	Yes	Yes
8(A)	Rehabilitation of overburden and spoils	Yes	Yes	Yes
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	Yes	Yes	Yes
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	Yes	Yes	Yes
9	Rehabilitation of subsided areas	Yes	Yes	Yes
10	General surface rehabilitation, including grassing of all denuded areas	Yes	Yes	Yes
11	River diversions	Yes	Yes	Yes
12	Fencing	Yes	Yes	Yes

13	Water management (Separating clean and dirty water, managing polluted water and managing the impact on groundwater, including treatment, when required)	Yes	Yes	Yes
14	2 to 3 years of maintenance and aftercare	Yes	Yes	Yes

5.6 Applicable Unit rates for closure components

A Master Rate for each closure component is provided, and A multiplication factor to apply to the Master Rate is provided in each table, depending on the risk class and the area sensitivity. The master rates that is shown below is only for the components with a multiplication factor other than 1.00.

Component 6 - Opencast Rehabilitation:

COMPONENT 6		OPENCAST REHABILITATION		
		UNIT	MASTER RATE	
		ha	R 221 404.27	
		Multiplication factor		
Risk Class (A, B or C)	A	0.04	0.52	1.00
	B	0.04	0.52	1.00
	C	0.04	0.52	1.00
		Low	Medium	High
		Environmental Sensitivity		

Component 8 (c) - Processing water deposits & Evaporation ponds:

COMPONENT 8 (C)		PROCESSING WATER DEPOSITS & EVAPORATION PONDS		
		UNIT	MASTER RATE	
		ha	R 549 961.80	
		Multiplication factor		
Risk Class (A, B or C)	A	0.59	0.80	1.00
	B	0.55	0.76	0.90
	C	0.51	0.66	0.81
		Low	Medium	High
		Environmental Sensitivity		

Component 13 – Water Management:

COMPONENT 13		WATER MANAGEMENT		
		UNIT	MASTER RATE	
		ha	R 45 791.99	
		Multiplication factor		
Risk Class (A, B or C)	A	0.60	0.67	1.00
	B	0.41	0.60	0.67
	C	0.17	0.25	0.33
		Low	Medium	High
		Environmental Sensitivity		

5.7 Weighting Factor 1 and 2

Weighting factor 1 are applied to all closure components:

Nature of the Terrain/Accessibility	Flat	Undulating	Rugged
Weighting Factor 1	1.00	1.10	1.20

Weighting factor 2 is applied to preliminary and general item only:

Proximity to urban area where goods and services are supplied	Urban	Peri-urban	Remote
Weighting Factor 2	1.00	1.05	1.10

5.8 Escalation

In South Africa, the Consumer Price Index or CPI measures changes in the prices paid by consumers for a basket of goods and services and is published Stats SA (Consumer Price Index, Statistical Release P0141).

The master rates as per the DMR were updated (escalated) by multiplying the master rate of the previous year with the new (average) CPI value.

Table 2: Consumer price indices headline year-on-year rates

	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Average
CPI	3.20%	2.90%	3.20%	4.40%	5.20%	4.90%	4.60%	4.90%	5.00%	5.00%	5.50%	5.90%	4.56%

5.9 Closure methods and assumptions

The DMR Guideline presents generally accepted closure methods, based on experience in the field, which have been used as the basis for determining the Master Rates for the various closure components in the “rules-based” approach. Where relevant, specific reference is made to the site conditions and requirements applicable to the closure of Kalgold mine. In addition, the relevant mine structures and components requiring closure are listed.

5.9.1 Component 1: processing plant

According to the DMR Guideline, the generally accepted closure methods applicable to processing plant include:

- All infrastructure and concrete buildings should be broken down to natural ground level and buried adjacent to the plant site.
- Foundations, structures, and conveyors should be broken down to natural ground level.
- The areas are to be covered with 1,0m subsoil, top soiled with 300mm of topsoil and vegetation established or as stated in the relevant EMP document.

- The monitoring and maintenance of these areas have been costed under the appropriate areas.
- Top soiling and vegetation for the areas are included under general surface rehabilitation.
- No credits are allowed for scrap steel and equipment that can be re-used or sold.

5.9.2 Components 2 (A), 2 (B) and 5: steel and reinforced concrete structures and housing, facilities and services

According to the DMR Guideline, the generally accepted closure methods applicable to this component include:

- All structures should be demolished to 1m below ground level.
- The rubble is to be buried adjacent to the sites, provided this adheres to the National Waste Management Strategy.
- Silos should be imploded and buried.
- The areas should be shaped, top soiled with 300mm of topsoil and vegetated or as stated in the relevant EMP document.
- Monitoring and maintenance is costed in the relevant areas.
- The concrete hardstand is the area between buildings such as workshops, offices, etc.

5.9.3 Component 3: rehabilitation of access roads

The DMR guideline does not provide a description of the extent of rehabilitation activities associated with this cost component. It is however expected that access road rehabilitation will include:

- Removal of all artificial road surface material (e.g. tarmac), and disposal at a suitably licenced facility.
- Deep ripping road surface.
- Placement of Existing culverts and storm water control infrastructure will be upgraded (using mainly gabions) to ensure its long-term effectiveness and its ability to handle a 1:50 year flood event.
- Surface topography that emulates the surrounding areas and aligned to the general landscape character. Steep slopes more than 6 percent should also be avoided if possible.
- Landscaping that would facilitate surface runoff and result in free draining areas. If possible, the drainage lines should be reinstated.
- An area without unnecessary remnants of structures and surface infrastructure to give the rehabilitated area a “neat” appearance. Special attention must be given to shape and/or removal of heaps of excess material being the legacy of prolonged mining and related activity.
- An area suitable for revegetation.

It is understood that the DMR Master Rate includes the replacement of topsoil and revegetation.

5.9.4 Component 8B: Process plant waste: basic, salt- producing

Basic, salt-producing residue deposits are typical of the following mining activities:

- Base metals (copper, cadmium, cobalt, iron-ore, molybdenum, nickel and tin),
- Chrome,
- Diamonds and precious stones,
- Gold, silver and uranium,
- Phosphate,
- Platinum,
- Mineral sands (ilmenite, titanium, rutile and zircon), and
- Industrial sands (andalusite, barite, bauxite, cryolite and fluorspar)

Based on the DMR Guideline, the Master Rate allows for a pollution control dam lined with a 1,5 mm thick HDPE liner, located on a prepared bed of 250 mm thickness. Allowance has also been made for geosynthetic layer between the bed and the HDPE liner. The liner would be secured to the outer perimeter of the pollution control dam by means of routine folding-in methods.

5.9.5 Component 10: general surface rehabilitation

Final surface rehabilitation of areas disturbed by mining and related activities should be aligned to the selected final land use. The generally accepted closure methods applicable to general surface rehabilitation includes:

- Surface topography that emulates the surrounding areas and aligned to the general landscape character. Steep slopes more than 6 percent should also be avoided if possible.
- Landscaping that would facilitate surface runoff and result in free draining areas. If possible, the drainage lines should be reinstated.
- An area without unnecessary remnants of structures and surface infrastructure to give the rehabilitated area a “neat” appearance. Special attention must be given to shape and/or removal of heaps of excess material being the legacy of prolonged mining and related activity.
- An area suitable for revegetation.

For Kalgold mine expansion it includes all new disturbed areas not captured in the current DMR Quantum (plant area (excluding buildings) and ROM pad)

5.9.6 Component 12: fencing

This item includes the removal of all fencing structures. The fencing included for Kalgold mine are for the processing plant and explosive magazine only.

5.9.7 Component 14: maintenance and aftercare

The generally accepted closure methods applicable to this component include:

- Annually fertilising of rehabilitated areas.
- Monitoring of surface and subsurface water quality surface.
- Control of wattle and all other alien plants.

5.9.8 Costs

The quantum for financial provisions for un-scheduled closure was estimated using the rule-based approach defined in the DMR Guideline. Refer to Table 3 for a summarised breakdown of the closure cost assessment estimate.

Table 3: Summary of Closure Cost for the Kalgold expansion project

CALCULATION OF THE QUANTUM							
MINE: Kalgold Mine				LOCATION: NORTH WEST			
EVALUATORS: MINELOCK ENVIRONMENTAL ENGINEERS (PTY) LTD				DATE: 2022/02/01			
NO	DESCRIPTION	UNIT	A QUANTITY	B MASTER RATE 2020	C MULTIPLICATI ON FACTOR	D WEIGHTING FACTOR	AMOUNT RAND 2021
1	Dismantling of processing plant and related structures (Including overland conveyors and power lines)	m ³	15 608.06	R 16.32	1.00	1.00	R 254 761.94
2(A)	Demolition of steel buildings and structures	m ²	2 824.27	R 227.37	1.00	1.00	R 642 142.18
2(b)	Demolition of reinforced concrete buildings and structures	m ²	4 156.21	R 335.07	1.00	1.00	R 1 392 602.48
3	Rehabilitation of access roads Including all haul roads	m ²	64 754.16	R 40.69	1.00	1.00	R 2 634 619.96
4(A)	Demolition and rehabilitation of electrified railway lines	m	-	R 394.90	-	-	R 0.00
4(B)	Demolition and rehabilitation of non-electrified railway lines	m ²	-	R 215.40	-	-	R 0.00
5	Demolition of housing and/or administration facilities	m ²	1 367.00	R 454.73	1.00	1.00	R 621 617.88
6	Opencast rehabilitation including final voids and ramps	ha	-	R 231 434.37	-	-	R 0.00
7	Sealing of shafts, adits and inclines	m ³	-	R 122.06	-	-	R 0.00
8(A)	Rehabilitation of overburden and spoils	ha	-	R 158 916.67	-	-	R 0.00

CALCULATION OF THE QUANTUM								
MINE: Kalgold Mine				LOCATION: NORTH WEST				
EVALUATORS: MINELOCK ENVIRONMENTAL ENGINEERS (PTY) LTD				DATE: 2022/02/01				
NO	DESCRIPTION	UNIT	A QUANTITY	B MASTER RATE 2020	C MULTIPLICATI ON FACTOR	D WEIGHTING FACTOR	AMOUNT RAND 2021	
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	ha	0.80	R 197 927.84	1.00	1.00	R 158 342.27	
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	-	R 574 876.28	-	-	R 0.00	
9	Rehabilitation of subsided areas	ha	-	R 133 068.78	-	-	R 0.00	
10	General surface rehabilitation	ha	33.30	R 125 888.81	1.00	1.00	R 4 191 589.94	
11	River diversions	ha	-	R 125 888.81	-	-	R 0.00	
12	Fencing	m	2 880.00	R 143.60	1.00	1.00	R 413 566.28	
13	Water management	ha	-	R 47 866.47	-	-	R 0.00	
14	2 to 3 years of maintenance and aftercare	ha	40.57	R 16 753.26	1.00	1.00	R 679 703.11	
Sub Total 1							R 10 988 946.05	
Weighting factor 2 (1.00)							R 10 988 946.05	
1	Preliminary and general	12 % of Sub Total 1				Sub Total 2		R 1 318 673.53
Sub Total 2							R 12 307 619.57	
7	Contingencies	10 % of Sub Total 1				Grand Total (Excl. VAT)		R 1 098 894.60
Grand Total (Excl. VAT)							R 13 406 514.18	

6. CONCLUSION

The financial provision for rehabilitation and closure for Kalgold mine is documented in this Report. No site visits were conducted and in those cases where information was not available, estimates / assumptions were made based on experience.

The Master Rates was escalated with an average CPI published till end of December 2021.

The closure costing assessment can be found in Appendix B. The Cost quantification in Appendix C shows the detailed breakdown of the quantities depicted in the cost breakdown.

Notwithstanding the above, the closure costs documented in this Report reflects the costs for closure costs provision for the expansion of Kalgold mine in December 2021.

7. REFERENCES

Department of Mineral Resources, 2005. *Guideline Document for The Evaluatuon of The Quantum of Closure-Related Financial Provision Provided by a Mine*, s.l.: s.n.

Department: Statistics South Africa, 2021. Statistical Release P0141. *Consumer Price Index October 2021*, 24 November, p. 6.



Is-Mari Kretschmer
Environmental Engineer



Douglas Richards
Director


Appendix A: Layout Plan



Kalgold Mine

Infrastructure layout for closure costing

Legend

 Kalgold Main Offices

New Explosive Magazine

New processing plant

New ROM Pad

Existing TSF

 Kalgold Main Offices



Google Earth

Image © 2022 Maxar Technologies

3 km



Appendix B: Cost Sheet



CLOSURE AND FINANCIAL PROVISION ASSESSMENT

Date 2022/02/01

Harmony Gold Kalgold Mine

Project Details:

Project Risk Class:	A	Gold
Project Area Sensitivity:	Medium	Located in an area on which the local people make a living.
Weighting Factor 1:	1	Flat topography
Weighting Factor 2:	1.05	Peri-urban: Less than 150 km from a developed urban area

No	Sub-Task	Unit	A. Quantity	B. Master Rate	C. Multiplication factor	D. Weighting Factor 1	E. = A*B*C*D
1	Dismantling of processing plant and related structures (including overland conveyors and power lines).	m ³	15 608.06	R 16.32	1.00	1.00	R 254 761.94
2A	Demolition of steel buildings and structures.	m ²	2 824.27	R 227.37	1.00	1.00	R 642 142.18
2B	Demolition of reinforced concrete buildings and structures.	m ²	4 156.21	R 335.07	1.00	1.00	R 1 392 602.48
3	Rehabilitation of access roads.	m ²	64 754.16	R 40.69	1.00	1.00	R 2 634 619.96
4A	Demolition and rehabilitation of electrified railway lines.	m	N/A	R 394.90	N/A	N/A	R 0.00
4B	Demolition and rehabilitation of non-electrified railway lines .	m	N/A	R 215.40	N/A	N/A	R 0.00
5	Demolition of housing and facilities.	m ²	1 367.00	R 454.73	1.00	1.00	R 621 617.88
6	Opencast rehabilitation including final voids and ramps .	ha	N/A	R 231 434.37	N/A	N/A	R 0.00
7	Sealing of shafts, adits and inclines.	m ³	N/A	R 122.06	N/A	N/A	R 0.00
8A	Rehabilitation of overburden and spoils.	ha	N/A	R 158 916.67	N/A	N/A	R 0.00
8B	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential).	ha	0.80	R 197 927.84	1.00	1.00	R 158 342.27
8C	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential).	ha	N/A	R 574 876.28	N/A	N/A	R 0.00
9	Rehabilitation of subsided areas .	ha	N/A	R 133 068.78	N/A	N/A	R 0.00
10	General surface rehabilitation, including grassing of all denuded areas.	ha	33.30	R 125 888.81	1.00	1.00	R 4 191 589.94
11	River diversions .	ha	N/A	R 125 888.81	N/A	N/A	R 0.00
12	Fencing.	m	2 880.00	R 143.60	1.00	1.00	R 413 566.28



CLOSURE AND FINANCIAL PROVISION ASSESSMENT

Date 2022/02/01

Harmony Gold Kalgold Mine

Project Details:

Project Risk Class:	A	Gold
Project Area Sensitivity:	Medium	Located in an area on which the local people make a living.
Weighting Factor 1:	1	Flat topography
Weighting Factor 2:	1.05	Peri-urban: Less than 150 km from a developed urban area

No	Sub-Task	Unit	A. Quantity	B. Master Rate	C. Multiplication factor	D. Weighting Factor 1	E. = A*B*C*D
13	Water management (Separating clean and dirty water, managing polluted water and managing the impact on groundwater, including treatment, when required).	ha	N/A	R 47 866.47	N/A	N/A	R 0.00
14	Maintenance and Aftercare	Ha	40.57	R 16 753.26	1.00	1.00	R 679 703.11
SUB-TOTAL							R 10 988 946.05
SUB-TOTAL 1 (Planned Closure)			Weighting Factor 2 (Step 4.4)			1.00	R 10 988 946.05
Time, Fee and Contingencies							
1	Preliminary and general		12% of Sub-total 1 if <R100 000 000				R 1 318 673.53
SUB-TOTAL 2							R 12 307 619.57
2	Contingencies		Add 10% of Sub-total 1				R 1 098 894.60
GRAND TOTAL							R 13 406 514.18

Appendix C: Cost Quantification



CLOSURE AND FINANCIAL PROVISION ASSESSMENT

Date 2022/02/01

Harmony Gold Kalgold Mine

nr	Description	Quantity	Unit	Comments	Area (m ²)	Assumptions
1	Dismantling of processing plant and related structures (including overland conveyors and power lines).					Assume same size as previous costing (HAR6930_NW77MR_CCA_2021)
	Car port (shaded net)	1 350.00	m ³	Assume 3m high	450.00	Assume plant will only be 50% completed within the 1st year from the commencement of the expansion project (As discussed on 24 Jan 2022)
	Paved area	245.00	m ³	Assume 0.1m height	2 450.00	Assume plant will only be 50% completed within the 1st year from the commencement of the expansion project (As discussed on 24 Jan 2022)
	Pipeline	761.45	m ³	Assume average of 0.5m dia	761.45	Excluded - assume to be underground
	Tank	13 237.58	m ³			
	Conveyors	275.48	m ³	Assume 3m high	91.83	Assume plant will only be 50% completed within the 1st year from the commencement of the expansion project (As discussed on 24 Jan 2022)
	Pipeline from RWD to processing plant	1 120.78	m ³	Assume average of 0.5m dia	1 120.78	Excluded - assume to be underground
	Pipeline from TSF to plant	1 015.40	m ³	Assume average of 0.5m dia	1 015.40	Excluded - assume to be underground
	Pipeline from TSF to D-zone pit	622.51	m ³	Assume average of 0.5m dia	622.51	Excluded - assume to be underground
	Pipeline from plant	893.92	m ³	Assume average of 0.5m dia	893.92	Excluded - assume to be underground
	Pipeline from D zone to RWD	439.99	m ³	Assume average of 0.5m dia	439.99	Excluded - assume to be underground
	Water pipeline	952.21	m ³	Assume average of 0.5m dia	952.21	Excluded - assume to be underground (Existing or new?)
	A-zone pit dewatering	113.83	m ³	Assume average of 0.5m dia	113.83	Excluded - assume to be underground (Existing or new?)
	Emergency dam to RWD	122.66	m ³	Assume average of 0.5m dia	122.66	Excluded - assume to be underground (Existing or new?)
	Watertank pit dewatering	289.27	m ³	Assume average of 0.5m dia	289.27	Excluded - assume to be underground (Existing or new?)
	Explosive magazine Tank	400.00	m ³			
	Total	15 608.06	m³		9 323.83	
2A	Demolition of steel buildings and structures.					Assume plant will only be 50% completed within the 1st year from the commencement of the expansion project (As discussed on 24 Jan 2022)



CLOSURE AND FINANCIAL PROVISION ASSESSMENT

Date 2022/02/01

Harmony Gold Kalgold Mine

nr	Description	Quantity	Unit	Comments	Area (m ²)	Assumptions
	Steel building at processing plant area	463.00	m ²			Assume plant will only be 50% completed within the 1st year from the commencement of the expansion project (As discussed on 24 Jan 2022)
	Steel building at processing plant area	1 715.50	m ²			Assume plant will only be 50% completed within the 1st year from the commencement of the expansion project (As discussed on 24 Jan 2022)
	Steel building at processing plant area	579.32	m ²			Assume plant will only be 50% completed within the 1st year from the commencement of the expansion project (As discussed on 24 Jan 2022)
	Steelwork at processing plant area	16.45	m ²			Assume plant will only be 50% completed within the 1st year from the commencement of the expansion project (As discussed on 24 Jan 2022)
	Steelwork at processing plant area	50.00	m ²			Assume plant will only be 50% completed within the 1st year from the commencement of the expansion project (As discussed on 24 Jan 2022)
	Total	2 824.27	m²		-	
2B	Demolition of reinforced concrete buildings and structures.					Assume same size as previous costing (HAR6930 NW77MR CCA 2021)
	Concrete at processing plant area	2 354.53	m ²	Assume 0.4m high	2 354.53	Converted from cube to square Assume plant will only be 50% completed within the 1st year from the commencement of the expansion project (As discussed on 24 Jan 2022)
	Concrete at processing plant area	1 590.69	m ²	Assume 0.4m high	1 590.69	Converted from cube to square Assume plant will only be 50% completed within the 1st year from the commencement of the expansion project (As discussed on 24 Jan 2022)



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Harmony Gold Kalgold Mine

nr	Description	Quantity	Unit	Comments	Area (m ²)	Assumptions
	Concrete at processing plant area	12.00	m ²			Assume plant will only be 50% completed within the 1st year from the commencement of the expansion project (As discussed on 24 Jan 2022)
	Concrete footing for substation	159.00	m ²			
	Explosive magazine concrete structure	40.00	m ²	Assume 0.2m high	8.00	Converted from cube to square
	Total	4 156.21	m²		3 945.21	
3	Rehabilitation of access roads.					
	8 Meter roads	64 754.16	m ²		64 754.16	Road lengths from Shape file (20211202 Layout layers)
	Total	64 754.16	m²		64 754.16	
4A	Demolition and rehabilitation of electrified railway lines.			N/A		
4B	Demolition and rehabilitation of non-electrified railway lines .			N/A		
5	Demolition of housing and facilities.					Assume same size as previous costing (HAR6930_NW77MR_CCA_2021)
	Brick building at processing plant area	1 058.50	m ²			Assume plant will only be 50% completed within the 1st year from the commencement of the expansion project (As discussed on 24 Jan 2022)
	Brick building at processing plant area	158.50	m ²			Assume plant will only be 50% completed within the 1st year from the commencement of the expansion project (As discussed on 24 Jan 2022)
	Buildings at processing plant area	50.00	m ²			Assume plant will only be 50% completed within the 1st year from the commencement of the expansion project (As discussed on 24 Jan 2022)
	Explosive magazine brick building	100.00	m ²			
	Total	1 367.00	m²			
6	Opencast rehabilitation including final voids and ramps .			N/A		
7	Sealing of shafts, adits and inclines.			N/A		
8A	Rehabilitation of overburden and spoils.			N/A		



CLOSURE AND FINANCIAL PROVISION ASSESSMENT

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Harmony Gold Kalgold Mine

nr	Description	Quantity	Unit	Comments	Area (m ²)	Assumptions
8B	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential).					As per Hydrological Assessment of the Harmony Kalgold Expansion Project by Hydrologic Consulting
	PCD1	0.80	ha			
	Total	0.80	ha			
8C	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential).			N/A		
9	Rehabilitation of subsided areas .			N/A		
10	General surface rehabilitation, including grassing of all denuded areas.					
	Processing plant area	10.70	ha			Area from Google Earth file (Layout.kml as received on 20 Aug 2021) - excluding buildings
	ROM footprint	22.60	ha			Area from Google Earth file (Layout.kml as received on 20 Aug 2021)
	Total	33.30	ha			
11	River diversions			N/A		
12	Fencing.					
	Dismantling of security fencing	2 880.00	m			Processing plant and magazine only
13	Water management (Separating clean and dirty water, managing polluted water and managing the impact on groundwater, including treatment, when required).			N/A		
14	Maintenance and Aftercare	-	ha			

Appendix D: DMR Rates



CLOSURE AND FINANCIAL PROVISION ASSESSMENT
Harmony Gold Kalgold mine

Date 2022/02/01

CC	Component	CPI%	0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
		Base rate	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
	Dismantling of processing plant and related structures (including overland conveyors and power lines).	R	6.82	R 6.82	R 7.14	R 7.65	R 8.53	R 9.13	R 9.53	R 10.00	R 10.56	R 11.16	R 11.84	R 12.39	R 13.18	R 13.88	R 14.52	R 15.11	R 15.61	R 16.32
1		R	95.00	R 95.00	R 99.47	R 106.53	R 118.78	R 127.21	R 132.68	R 139.31	R 147.12	R 155.50	R 164.99	R 172.58	R 183.62	R 193.35	R 202.25	R 210.54	R 217.45	R 227.37
2A	Demolition of steel buildings and structures.	R	140.00	R 140.00	R 146.58	R 156.99	R 175.04	R 187.47	R 195.53	R 205.31	R 216.80	R 229.16	R 243.14	R 254.32	R 270.60	R 284.94	R 298.05	R 310.27	R 320.46	R 335.07
2B	Demolition of reinforced concrete buildings and structures.	R	17.00	R 17.00	R 17.80	R 19.06	R 21.25	R 22.76	R 23.74	R 24.93	R 26.33	R 27.83	R 29.52	R 30.88	R 32.86	R 34.60	R 36.19	R 37.68	R 38.91	R 40.69
3	Rehabilitation of access roads.	R	165.00	R 165.00	R 172.76	R 185.02	R 206.30	R 220.95	R 230.45	R 241.97	R 255.52	R 270.08	R 286.56	R 299.74	R 318.92	R 335.83	R 351.27	R 365.68	R 377.68	R 394.90
4A	Demolition and rehabilitation of electrified railway lines.	R	90.00	R 90.00	R 94.23	R 100.92	R 112.53	R 120.52	R 125.70	R 131.98	R 139.37	R 147.32	R 156.30	R 163.49	R 173.96	R 183.18	R 191.60	R 199.46	R 206.01	R 215.40
4B	Demolition and rehabilitation of non-electrified railway lines .	R	190.00	R 190.00	R 198.93	R 213.05	R 237.56	R 254.42	R 265.36	R 278.63	R 294.23	R 311.00	R 329.98	R 345.15	R 367.24	R 386.71	R 404.50	R 421.08	R 434.91	R 454.73
5	Demolition of housing and facilities.	R	96 700.00	R 96 700.00	R 101 244.90	R 108 433.29	R 120 903.12	R 129 487.24	R 135 055.19	R 141 807.95	R 149 749.19	R 158 284.90	R 167 940.28	R 175 665.53	R 186 908.12	R 196 814.25	R 205 867.71	R 214 308.28	R 221 344.74	R 231 434.37
6	Opencast rehabilitation including final voids and ramps .	R	51.00	R 51.00	R 53.40	R 57.19	R 63.76	R 68.29	R 71.23	R 74.79	R 78.98	R 83.48	R 88.57	R 92.65	R 98.58	R 103.80	R 108.58	R 113.03	R 116.74	R 122.06
7	Sealing of shafts, adits and inclines.	R	66 400.00	R 66 400.00	R 69 520.80	R 74 456.78	R 83 019.31	R 88 913.68	R 92 736.96	R 97 373.81	R 102 826.75	R 108 687.87	R 115 317.83	R 120 622.45	R 128 342.29	R 135 144.43	R 141 361.07	R 147 156.88	R 151 988.53	R 158 916.67
8A	Rehabilitation of overburden and spoils.	R	82 700.00	R 82 700.00	R 86 586.90	R 92 734.57	R 103 399.05	R 110 740.38	R 115 502.21	R 121 277.32	R 128 068.85	R 135 368.78	R 143 626.28	R 150 233.08	R 159 848.00	R 168 319.95	R 176 062.66	R 183 281.23	R 189 298.97	R 197 927.84
8B	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste).	R	240 200.00	R 240 200.00	R 251 489.40	R 269 345.15	R 300 319.84	R 321 642.55	R 335 473.18	R 352 246.84	R 371 972.66	R 393 175.10	R 417 158.78	R 436 348.09	R 464 274.36	R 488 880.90	R 511 369.43	R 532 335.57	R 549 813.92	R 574 876.28
8C	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste).	R	55 600.00	R 55 600.00	R 58 213.20	R 62 346.34	R 69 516.17	R 74 451.81	R 77 653.24	R 81 535.90	R 86 101.91	R 91 009.72	R 96 561.32	R 101 003.14	R 107 467.34	R 113 163.11	R 118 368.61	R 123 221.72	R 127 267.50	R 133 068.78
9	Rehabilitation of subsided areas .	R	52 600.00	R 52 600.00	R 55 072.20	R 58 982.33	R 65 765.29	R 70 434.63	R 73 463.32	R 77 136.48	R 81 456.13	R 86 099.13	R 91 351.17	R 95 553.33	R 101 668.74	R 107 057.18	R 111 981.81	R 116 573.07	R 120 400.55	R 125 888.81
10	General surface rehabilitation, including grassing of all denuded areas.	R	52 600.00	R 52 600.00	R 55 072.20	R 58 982.33	R 65 765.29	R 70 434.63	R 73 463.32	R 77 136.48	R 81 456.13	R 86 099.13	R 91 351.17	R 95 553.33	R 101 668.74	R 107 057.18	R 111 981.81	R 116 573.07	R 120 400.55	R 125 888.81
11	River diversions .	R	60.00	R 60.00	R 62.82	R 67.28	R 75.02	R 80.34	R 83.80	R 87.99	R 92.92	R 98.21	R 104.20	R 109.00	R 115.97	R 122.12	R 127.74	R 132.97	R 137.34	R 143.60
12	Fencing.	R	20 000.00	R 20 000.00	R 20 940.00	R 22 426.74	R 25 005.82	R 26 781.23	R 27 932.82	R 29 329.46	R 30 971.91	R 32 737.31	R 34 734.29	R 36 332.06	R 38 657.32	R 40 706.15	R 42 578.64	R 44 324.36	R 45 779.68	R 47 866.47
13	Water management (Separating clean and dirty water, managing polluted water and managing the impact on groundwater, including treatment, when required).	R	7 000.00	R 7 000.00	R 7 329.00	R 7 849.36	R 8 752.04	R 9 373.43	R 9 776.49	R 10 265.31	R 10 840.17	R 11 458.06	R 12 157.00	R 12 716.22	R 13 530.06	R 14 247.15	R 14 902.52	R 15 513.53	R 16 022.89	R 16 753.26
14	2 to 3 years of maintenance and aftercare.	R		R																



CLOSURE AND FINANCIAL PROVISION ASSESSMENT

Harmony Gold Kalgold mine

Date 2022/02/01

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
2005	3	2.6	3	3.4	3.3	2.8	3.4	3.9	4.4	4	3.4	3.6	3.4
2006	4	3.9	3.4	3.3	3.9	4.9	5	5.4	5.3	5.4	5.4	5.8	4.7
2007	6	5.7	6.1	7	6.9	7	7	6.7	7.2	7.9	8.4	9	7.1
2008	9.3	9.8	10.6	11.1	11.7	12.2	13.4	13.7	13.1	12.1	11.8	9.5	11.5
2009	8.1	8.6	8.5	8.4	8	6.9	6.7	6.4	6.1	5.9	5.8	6.3	7.1
2010	6.2	5.7	5.1	4.8	4.6	4.1	3.7	3.5	3.2	3.4	3.6	3.5	4.3
2011	3.7	3.7	4.1	4.2	4.6	5	5.3	5.3	5.7	6	6.1	6.1	5
2012	6.3	6.1	6	6.1	5.7	5.5	4.9	5	5.5	5.6	5.6	5.7	5.6
2013	5.4	5.9	5.9	5.9	5.6	5.5	6.3	6.4	6	5.5	5.3	5.4	5.7
2014	5.8	5.9	6	6.1	6.6	6.6	6.3	6.4	5.9	5.9	5.8	5.3	6.1
2015	4.4	3.9	4	4.5	4.6	4.7	5	4.6	4.6	4.7	4.8	5.2	4.6
2016	6.2	7	6.3	6.2	6.1	6.3	6	5.9	6.1	6.4	6.6	6.8	6.4
2017	6.6	6.3	6.1	5.3	5.4	5.1	4.6	4.8	5.1	4.8	4.6	4.7	5.3
2018	4.4	4	3.8	4.5	4.4	4.6	5.1	4.9	4.9	5.1	5.2	4.5	4.6
2019	4	4.1	4.5	4.4	4.5	4.5	4	4.3	4.1	3.7	3.6	4	4.1
2020	4.5	4.6	4.1	3	2.1	2.2	3.2	3.1	3	3.3	3.2	3.1	3.3
2021	3.2	2.9	3.2	4.4	5.2	4.9	4.6	4.9	5	5	5.5	5.9	4.56