Project Reference: 720.20002.00065 File Ref. Tharisa_WRD_Closure Liability Estimate_October 2022

18 October 2022

SLR Consulting (South Africa) (Pty) Ltd

ATTENTION:	Mr. Patrick Sibuyi Tharisa Minerals (Pty) Ltd

CLOSURE LIABILITY CALCULATION FOR THE ADDITIONAL WASTE ROCK STORAGE AT THE THARISA MINE AS AT OCTOBER 2022 (WRITTEN IN SUPPORT OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS)

1. INTRODUCTION

SLR Consulting (South Africa) (Pty) Ltd (SLR) has been appointed by Tharisa Minerals (Pty) Ltd to undertake the necessary environmental impact assessment for the additional waste rock storage (referred to as the Proposed Project). In this regard, Tharisa is making an application to the DMRE for an integrated EA and update of the mine's EMPr and is proposing the following:

- The expansion of the existing and approved Far West WRD 1 by a footprint of 109 ha. The expanded area will be referred to as the West Above Ground (OG) WRD. Portions of the West OG WRD will be located on backfilled areas of the West Pit; and
- The establishment of a waste rock dump (referred to as the East OG WRD) on backfilled portions of the East Pit. The proposed East OG WRD will cover an area of approximately 72 ha.

This closure liability calculation has been prepared for the sole purpose of a closure liability estimate (CLE) for the existing application process for the proposed project at Tharisa Mine, located on farms 342 JQ and Elandsdrift 467 JQ, south of the Marikana Town, in the North West Province of South Africa.

2. CLOSURE LIABILITY ESTIMATION PROCEDURE

2.1 CLOSURE ACTIVITIES

The closure liability estimate took account of infrastructure and closure activities associated with the proposed project, namely:

- Rehabilitation of the overburden and spoils associated to the two waste rock dumps, described above;
- Engineering and Management of such activities during the closure process; and,
- Care and Maintenance for two to three years following the closure of the two waste rock storage facilities; and,
- General site rehabilitation and maintenance, upon Life of Mine.

2.2 ASSUMPTIONS

The determination of the decommissioning costs associated with the proposed project required a number of assumptions to be made. These assumptions were primarily associated with site infrastructure, in particular its current decommissioning plan, the state of the facilities when undertaking the proposed project, and an assumption relating to the impact of specialist studies onto this project.

The following assumptions were made for the purposes of this report:

- The boundaries of the site will remain in place and no fencing will be amended to accommodate the proposed project.
- Complete backfill of the open pit voids has been excluded in these liability calculations. In the event of premature mine closure, it is anticipated that the open pits will not be backfilled (i.e., not sterilise remaining resources) and instead be allowed to fill with water to roughly 10m below NGL (the baseline groundwater levels). For the purpose of this costing quantum, it assumes the pits are fully backfilled and that the additional waste rock material pertains to the material above the natural ground level only.
- There will be no requirement to cover the removal and/or destruction of surface infrastructure remnants and/or other undesirable objects such as trees, foundations, concrete slabs, etc. These will not be required in the Waste Rock Dump areas.
- The WRD rehabilitation (i.e., shaping and re-vegetation) will occur within the boundary battery limits proposed in Figure 1 and an additional allowance would not be required.
- Detail design closure items includes the planning component and assumes 2 weeks would be sufficient to compile conceptual design drawings.
- The proposed project configuration is based on the drawings provided by the project team at the commencement of calculating the quantum, July/August 2022.

2.2.1 Site Reinstatement:

- The areas assigned to the west and east WRD facilities are defined as already disturbed (i.e., brownfield) and as such, the general rehabilitation of these areas will have been provided for in previous CLE's. However, the shaping and revegetation of these slopes has been included given the change in the closure approach.
- The access road removal was excluded, as the access road already exists into the waste rock storage facilities.
- A provisional sum has been included to cover care and maintenance works at the two storage facilities during a 2–3-year post closure maintenance and aftercare program.

2.2.2 Specialist Studies:

- The development of an updated closure plan (based on the proposed project) has been included in the quantum; however, if required, any additional EIA/EMPr amendments for facility closure in order to obtain all the necessary permits or approvals for decommissioning, demolition, remediation and rehabilitation of the site, has not been included in this estimate.
- Given the site location, the additional waste rock storage facilities will be placed upon an existing backfilled area of the same material, it is assumed the environmental impacts would be of a similar nature and as such, these costs would already be included into the annual financial provision.
- Site specific aspects such as surface remediation have not been costed at this stage – the likelihood of such remediation would only be identified through ongoing surface monitoring and/or by carrying out risk assessment and water pollution potential studies/investigations during mine operations i.e., addressing it

before closure and eliminating the need for related closure provisions. However, the hydrogeological impact was highlighted by the Specialist to be of significance and as such, a financial estimate was included into the quantum costs. It was assumed that only annual monitoring would be required upon completion of well network; however, these details would need to be finalised in a monitoring plan and discussed with the authorities to ensure compliance during the closure phase of the project.

2.2.3 General:

- The decommissioning costs are based on conceptual site plans made available by the client;
- No assessment of the suitability of the WRD design details has been made;
- Costs are based on SLR's knowledge of local market rates for engineering works of this nature, along with standard cost indices;
- SLR has assumed that there are no constraints to the decommissioning process, and that the decommissioning contractor can programme the works to make most efficient use of his available resources;
- Engagement with all necessary stakeholders and the site neighbours during the life of the facility(s) and at closure are covered under owners operating costs and not included in this estimate;
- The costs include for preliminary and management costs, as well as contingencies, as standard percentages of overall cost;
- An allowance for client supervision during the decommissioning works has not been included; and
- The demolished infrastructure is assumed to have zero salvage value.

2.3 QUANTITIES

The quantities associated with the additional waste rock storage facilities were primarily measured off the infrastructure layout provided; namely, "Site Layout" (see Appendix A), as well as, from Google Earth.

2.4 UNIT RATES

The financial closure liability costs for the proposed project were as per the *Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine* as published by the Department of Mineral Resources and Energy (DMRE) (previously known as the Department of Minerals and Energy [DME]), dated January 2005.

The unit (Master) rates for each closure component are taken from the DMRE guideline (and inflated by the Consumer Price Index (CPI) to account for escalation since January 2005) and a Multiplication Factor applied depending on the Risk Ranking and the Environmental Sensitivity.

The average annual percentage change in the CPI as provided by Statistics South Africa is presented in Table 1:

Table 2-1: CPI as provided by Statistics South Africa

January to December						
2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
3.4 %	4.6 %	7.2 %	11.5 %	7.1 %	4.3 %	5.0 %
2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
5.6 %	5.7 %	6.1 %	4.6 %	6.4 %	5.3 %	4.7 %
2019	**2020**	**2021**	**2022**			
4.1 %	3.3 %	4.5 %	*6.18 %			

* Note: An average monthly percentage was utilised to account for the first 6 months of 2022.

A total of 262.91 % since January 2005 has been calculated (i.e., 1.034 x 1.046 x 1.072 … etc.).

2.5 TIME, FEE AND CONTINGENCY COSTS

The time, fee, weighting factors for urban area location, weighting factor for terrain and contingency costs were taken as per the guidance of the DMRE guideline, namely:

- Weighting Factors (Terrain and Urban Area), 10 % and 5 %, respectively;
- Preliminary and general, 6 %; and
- Contingency, 10 %.

This would account for contractor's preliminary and general costs covering site establishment, site demobilisation, supervision of works, site security, accommodation during site works etc.

3. CLOSURE LIABILITY CALCULATION

The current financial closure liability associated with the proposed additional Waste Rock Storage facilities (as of October 2022) is R 61 452 044.40 (including VAT). This amount has been calculated at Current Value (CV) as of 13 October 2022. The liability calculation is provided in Appendix B.

The calculated financial liability is considered to be Class 1 estimate (with an accuracy between +25% and -15%) based on the overall generic approach as stipulated by the DMRE Guideline Document.

4. RECOMMENDATIONS

Once the Additional WRD's have been constructed, it is recommended that an updated closure plan be developed that includes a decommissioning strategy and decommissioning plan.

The decommissioning strategy should consider at least:

- Optimal approaches for rehabilitation;
- Options for extending the WRD Facility's life; and
- Any other options that optimise the decommissioning spend, whilst still remaining legal and compliant.

The decommissioning plan should as a minimum include the following:

- A Decommissioning strategy;
- Legal and governance framework;
- Details of stakeholder consultation;
- Environmental risk assessment;
- Socio-economic impact assessment;
- Post closure land use(s);
- Concurrent decommissioning and rehabilitation work undertaken (e.g., at temporary laydown area(s));
- Schedule of closure activities (including necessary permits and approvals);
- Monitoring and aftercare requirements; and
- Site relinquishment criteria.

The overall financial provision for the mine should account for the assumptions in this report when updating the annual financial provision, as well as ensuring the methodology for all areas of the mine are consistent when calculating the costing quantum. Likewise, the specialist studies required to be undertaken in the waste rock facilities should be reviewed, and if required, an amendment to the annual financial provision needs to account for specialist studies.

Additionally, the encroachment of any WRD's into no-go areas/buffer zones should be assessed and addressed as part of operations (if required). Failing this, the issue should be dealt with as part of detailed closure planning. SLR has not verified the location of the footprints of any of the WRD's.

5. STATEMENT OF LIMITATIONS

The DMRE Guideline Document is a "high-level" closure liability estimate that does not necessarily address all the mine-related closure issues (hence the replacement of the DMRE Guideline as of 19 February 2020, and the implementation of the Financial Provisioning Regulations – with specific guidance and instruction when developing closure plans).

The calculated financial closure liability only considers the routine costs associated with decommissioning of plant and infrastructure, the restoration of any environmental damage caused predominantly at the pre-production stage, and the maintenance and aftercare of the rehabilitated sites.

This closure liability calculation currently assumes that no infrastructure will be demolished and that the mine infrastructure has zero salvage value.

It is currently not possible to meaningfully quantify certain closure liabilities (especially regarding any potential water and revegetation liabilities and related remediation) when material uncertainties exist. The hydrogeological costs included are based on current mitigation measures and should not be deemed the final closure strategy and cost. Any other specialist requirements will be highlighted in the closure plan; as such, site-specific aspects, have not been costed for at this stage.

Therefore, any uncertainties relating to closure should be highlighted in an updated closure plan (as per the FPR, 2019) requiring further analysis and/or monitoring. The remaining life of mine at Tharisa will further indicate the required accuracy of the closure liability calculations, as well as the level of investigations/studies that need to be undertaken.

Yours faithfully

Stephen Weber

APPENDIX A - PROPOSED INFRASTRUCTURE LAYOUTS

45000

50000

-2845000

-2850000

N

ROOIKOPPIES 297 JQ

MIDDELKRAAL 466 JQ

342 JQ

BUFFELSPOORT 343 JQ

ELANDSDRIFT 467 JQ

SPRUITFONTEIN 341 JQ

IN DIE KOM 345 JQ

Western Platinum Mine

Western Platinum Mine

Marikana Platinum Mine

Lapologang Community

Maditlhokwa Community

Bokamoso Community

Samancor

Marikana Road

D1325

D1270

D1526

D2565

D1566

Old N4 (P2-4)

N4

P2-4

Brakspruit Tributary

Maretlwane Tributary

Unnamed Tributary

Buffelspoort

Sterkstroom

Elanddriftspruit Tributary

W OG WRD

West Pit

East WRD

East Pit

Far East WRD 2

Far East WRD 1

Far West WRD 1

E OG WRD

West WRD 1

ROM Pad

Mining Contractor Area

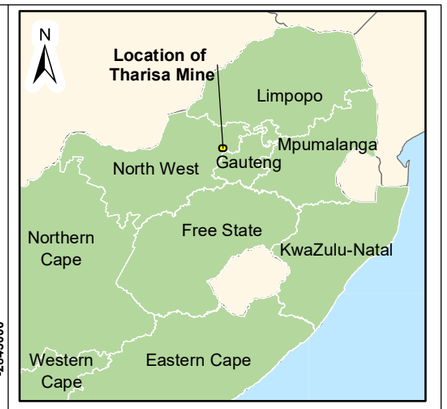
Plant

TSF 1

TSF 2

Berm

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

- Tharisa Mining Right Area
- Final Pit Extent
- Proposed Project Components
- Mining and Related Areas
- School and Graveyard
- Farm Boundaries
- Rivers - Perennial
- Rivers - Non-Perennial

0 500 1 000 Meters

Scale: 1 : 31 500 @ A3

Projection: Transverse Mercator
Datum: Hartebeeshoek, Lo27

THARISA MINERALS (Pty) Ltd

Figure 5

Site Layout

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2022/04/25

APPENDIX B – CLOSURE LIABILITY CALCULATION

CALCULATION OF THE QUANTUM								
Area	***Anglo American Mogalakwena Mine - Nugen Project (Calculated as of August 2022)***							
No.	**Description:**	**Unit:**	**Operational Area**	**A Quantity**	**B Master rate**	**C Multiplication factor**	**D Weighting factor 1**	**E=A*B*C*D Amount (Rands)**
				Step 4.5	**Step 4.3**	**Step 4.3**	**Step 4.4**	
1	Dismantling of processing plant & related	m^3	n/a	0	R 17.93	1	1.1	R 0.00
2 (A)	Demolition of steel buildings & structures	m^2	n/a	0	R 249.77	1	1.1	R 0.00
2 (B)	Demolition of reinforced concrete buildings & structures	m^2	n/a	0	R 368.08	1	1.1	R 0.00
		m^2	n/a	0	R 368.08	1	1.1	R 0.00
3	Rehabilitation of access roads	m^2	n/a	0	R 44.70	1	1.1	R 0.00
4 (A)	Demolition & rehabilitation of electrified railway lines	m	n/a	0	R 433.81	1	1.1	R 0.00
4 (B)	Demolition & rehabilitation of non electrified railway lines	m	n/a	0	R 236.62	1	1.1	R 0.00
5	Demolition of housing &/or administration facilities	m^2	n/a	0	R 499.53	1	1.1	R 0.00
		m^2	n/a	0	R 499.53	1	1.1	R 0.00
6	Opencast rehabilitation including final voids & ramps	ha	n/a	0	R 254 236.43	0.52	1.1	R 0.00
7	Sealing of shafts, adits & inclines	m^3	n/a	0	R 134.09	1	1.1	R 0.00
8 (A)	Rehabilitation of overburden & spoils	ha	Waste Rock Dump West	109	R 174 573.93	1	1.1	R 20 931 414.01
			Waste Rock Dump East	72	R 174 573.93	1	1.1	R 13 826 255.12
8 (B)	Rehabilitation of processing waste deposits	ha	n/a	0	R 217 428.67	1	1.1	R 0.00
8 (C)	Rehabilitation of processing waste deposits	ha	n/a	0	R 631 515.93	0.66	1.1	R 0.00
9	Rehabilitation of subsided areas	ha	n/a	0	R 146 179.37	1	1.1	R 0.00
10	General surface rehabilitation	ha	n/a	0	R 138 292.00	1	1.1	R 0.00
11	River diversions (to be decommissioned)	ha	n/a	0	R 138 292.00	1	1.1	R 0.00
12	Fencing	m	n/a	0	R 157.75	1	1.1	R 0.00
13	Water management	ha	n/a	0	R 52 582.51	0.25	1.1	R 0.00
14	2 to 3 years of maintenance & aftercare	ha	Additional Areas	181.000	R 18 403.88	1	1.1	R 3 664 212.11
15 (A)	Specialist Studies/Allowances	SUM	Closure - Engineering & Management	1	R 1 260 380.00	1	1	R 1 260 380.00
		SUM	Hydrogeological Assessment	1	R 4 190 120.00	1	1	R 4 190 120.00
							Sub Total 1 (Sum of items 1 to 15 Above)	R 43 872 381.24
17	Multiply Subtotal 1 by Weighting Factor 2 (step 4.4)				5.0% of Subtotal 1			R 2 193 619.06
							Subtotal 2 (Subtotal 1 plus Weighting Factor 2 value)	R 46 066 000.30
18	Preliminary and General (P&G's)				6.0% of Subtotal 2			R 2 763 960.02
							Subtotal 3 (Subtotal 2 plus P&G's value)	R 48 829 960.32
19	Contingency				10.0% of Subtotal 2			R 4 606 600.03
							Subtotal 4 (Subtotal 3 plus Contingency value)	R 53 436 560.35
20	VAT				15.0% of Subtotal 3			R 8 015 484.05
							GRAND TOTAL (Subtotal 4 plus VAT)	R 61 452 044.40

Overburden and Spoils Rehabilitation
Quantum Costing as of August 2022

Component Description	Closure Elements		Quantum Costing				
Rehabilitation of overburden & spoils	**Area**	**Activity**	**Quantity**	**Unit**	**Rate (ZAR)**	**Weighting Factor**	**Total (ZAR)**
	WRD West	Shaping and grassing/vegetation	109	ha			
	WRD East	Shaping and grassing/vegetation	72	ha			
	Total		181	ha			
		Shaping and grassing/vegetation	181	ha	R 174 573.93		R 31 597 881.03

Summary - Overburden and Spoils Rehabilitation

TOTAL - Rehabilitation of overburden & spoils	**R 31 597 881.03**

Engineering, Care and Maintenance Costs
Quantum Costing as of August 2022

Component Description	Closure Elements		Quantum Costing				
2 to 3 years of maintenance & aftercare	**Area**	**Activity**	**Quantity**	**Unit**	**Rate (ZAR)**	**Weighting Factor**	**Total (ZAR)**
		Develop Closure Plan Update	60	hrs	R 1 980.00	1.1	R 130 680.00
		Detail Design Closure Requirements	80	hrs	R 2 200.00	1.1	R 193 600.00
	WRD West	Supervision Costs	250	hrs	R 1 500.00	1.1	R 412 500.00
	WRD East	Supervision Costs	200	hrs	R 1 500.00	1.1	R 330 000.00
		Management Costs	80	hrs	R 2 200.00	1.1	R 193 600.00
		Care & Maintenance	181	ha	R 18 403.88	1.1	R 3 664 212.11

Summary - Overburden and Spoils Rehabilitation

Engineering and Management costs	R 1 260 380.00
Maintenance and Aftercare	R 3 664 212.11
TOTAL - 2 to 3 years of maintenance & aftercare	**R 4 924 592.11**

Specialist Costs
Quantum Costing as of October 2022

Component Description	Closure Elements		Quantum Costing				
Hydrogeological Assessment	**Area**	**Activity**	**Quantity**	**Unit**	**Rate (ZAR)**	**Weighting Factor**	**Total (ZAR)**
		Develop Monitoring Plan	40	hrs	R 1 980.00	1.1	R 87 120.00
		Well Installation and development (8 Wells)	8	no.	R 190 000.00	1.1	R 1 672 000.00
		Pump Testing	3	no.	R 90 000.00	1.1	R 297 000.00
		Supervision Costs	240	hrs	R 1 100.00	1.1	R 290 400.00
		Management Costs	80	hrs	R 2 200.00	1.1	R 193 600.00
		Annual Monitoring	10	years	R 150 000.00	1.1	R 1 650 000.00

Summary - Hydrogeological

Hydrogeological costs	R 4 190 120.00
TOTAL - Hydrogeological Assessment	**R 4 190 120.00**