#### APPENDIX M: FINANCIAL PROVISION



Project Reference: T014-12

Tharisa Mine Tharisa Minerals (Pty) Ltd

# CALCULATION OF THE FINANCIAL CLOSURE LIABILITY FOR THARISA MINE AS PART OF EIA/EMP AMENDMENT REPORT

# 1. INTRODUCTION

This financial closure liability calculation is an initial estimate that has been prepared by SLR Consulting (Pty) Ltd and submitted as part of the EIA/EMP Amendment Report for the Tharisa Mine.

The calculations of the financial closure liability associated with the Tharisa Mine have been completed in accordance with the *Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine* as published by the DMR (previously known as the Department of Minerals and Energy (DME)), dated January 2005.

# 2. INPUT TO THE FINANCIAL CLOSURE LIABILITY CALCULATION

The DMR procedure for calculating financial closure liability is summarised as follows:

- Step 1: Determine the primary mineral and saleable mineral by-products.
- Step 2: Determine the risk class of the mine.
- Step 3: Determine the area sensitivity in which the mine is located.
- Step 4.1: Determine the level of information available for calculating the financial liability.
- Step 4.2: Determine the closure components associated with the mine.
- Step 4.3: Determine the unit rates for the associated closure components.
- Step 4.4: Determine and apply various weighting factors (site specific).
- Step 4.5: Identify the areas of disturbance.
- Step 4.6: Identify any specialist studies required.
- Step 4.7: Calculate the closure liability using the DMR template provided.

The areas shaded in grey in the following sub-chapters are the values/information used in the calculation of the current financial liability associated with Tharisa Mine.

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#### 2.1. STEP 1: MINE TYPE AND SALEABLE MINERAL BY-PRODUCT

DMR require that the type of mineral mined or processed, and the saleable mineral by-products (not trace elements) be identified.

Mine/Process type	Chrome and Platinum Mine – Opencast
Saleable mineral by-product	Chrome ore and PGM concentrate

#### 2.2. STEP 2: RISK RANKING

According to the DMR guideline, Tharisa Mine (due to its minerals mined (chrome and platinum) and tonnages (greater than 10,000 tonnes per month)) is classified as a Class A – High risk facility.

The risk ranking class is used later to determine the multiplication factors applied to the master rate (see Step 4.3).

Primary risk ranking	Class A <sup>1</sup> – High risk (Large mine, greater than 10,000 tonnes per month)
Revised risk ranking	N/A

#### 2.3. STEP 3: ENVIRONMENTAL SENSITIVITY OF THE MINE AREA

Tharisa Mine is classified as having a Medium environmental sensitivity based on the classification criteria below.

- A low biophysical sensitivity (based on the pre-mining environment of the project area).
- A medium social sensitivity (based on the proximity of the project area to local communities).
- A medium economic sensitivity (based on the area's existing economic activity).

The environmental sensitivity ranking is used later to determine the multiplication factors applied to the master rate (see Step 4.3).

<sup>&</sup>lt;sup>1</sup> Class A – High risk = A high probability of occurrence of an impact with a severe consequence.

Sonoitivity		Sensitivity Criteria									
Sensitivity	Biophysical	Social	Economic								
Low	<ul> <li>Largely disturbed from natural state,</li> <li>Limited natural fauna and flora remains,</li> <li>Exotic plant species evident,</li> <li>Unplanned development,</li> <li>Water resources disturbed and impaired.</li> </ul>	<ul> <li>The local communities are not within sighting distance of the mining operation,</li> <li>Lightly inhabited area (rural).</li> </ul>	<ul> <li>The area is insensitive to development,</li> <li>The area is not a major source of income to the local communities.</li> </ul>								
Medium	<ul> <li>Mix of natural and exotic fauna and flora,</li> <li>Development is a mix of disturbed and undisturbed areas, within an overall planned framework,</li> <li>Water resources are well controlled.</li> </ul>	<ul> <li>The local communities are in proximity of the mining operation (within sighting distance),</li> <li>Peri-urban area with density aligned with a development framework,</li> <li>Area developed with an established infrastructure.</li> </ul>	<ul> <li>The area has a balanced economic development where a degree of income for the local communities is derived from the area,</li> <li>The economic activity could be influenced by indiscriminate development.</li> </ul>								
High	<ul> <li>Largely in natural state,</li> <li>Vibrant fauna and flora, with species diversity and abundance matching the nature of the area,</li> <li>Well planned development,</li> <li>Area forms part of an overall ecological regime of conservation value,</li> <li>Water resources emulate their original state.</li> </ul>	<ul> <li>The local communities are in close proximity of the mining operation (on the boundary of the mine),</li> <li>Densely inhabited area (urban/dense settlements),</li> <li>Developed and well-established communities.</li> </ul>	<ul> <li>The local communities derive the bulk of their income directly from the area,</li> <li>The area is sensitive to development that could compromise the existing economic activity.</li> </ul>								

# 2.4. STEP 4.1: LEVEL OF INFORMATION AVAILABLE

The level of information available allows DMR to either accept (and/or independently review) the financial closure liability submitted, otherwise follow the 'rule-based' approach.

	Information available must include the following:						
<b>Extensive</b> • An Approved EMP, or in the process of being approved,							
	A detailed Closure Plan based on the EMP,						
	A detailed breakdown of costs envisaged for rehabilitation and closure.						
Limited <sup>2</sup>	Information available is less comprehensive than that given above						

Since no detailed Closure Plan for Tharisa Mine has been developed and/or approved by the relevant Authorities, and hence no detailed breakdown of costs prepared and sufficiently motivated, the step-by-step 'rule-based' DMR approach for calculating closure liability should be followed.

<sup>&</sup>lt;sup>2</sup> Limited information available requires that DMR follow the 'rule-based' approach (see Step 4.3).

# 2.5. STEP 4.2: CLOSURE COMPONENTS TO BE USED

The closure components relevant to Tharisa Mine are identified from the list below.

No.	Description of Closure Components <sup>3</sup>	Applicable
1	Dismantling of processing plant & related structures (incl. overland conveyors & power lines)	Yes
2 (A)	Demolition of steel buildings & structures	Yes
2 (B)	Demolition of reinforced concrete buildings & structures	Yes
3	Rehabilitation of access roads	Yes
4 (A)	Demolition & rehabilitation of electrified railway lines	No
4 (B)	Demolition & rehabilitation of non electrified railway lines	No
5	Demolition of housing &/or administration facilities	Yes
6	Opencast rehabilitation including final voids & ramps	Yes
7	Sealing of shafts, adits & inclines	No
8 (A)	Rehabilitation of overburden & spoils	Yes
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	Yes
8 (C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	No
9	Rehabilitation of subsided areas	No
10	General surface rehabilitation	Yes
11	River diversions	No
12	Fencing (i.e. high level security perimeter fencing)	No
13	Water management	Yes
14	2 to 3 years of maintenance & aftercare	Yes

Further details of the DMR specified closure components are summarised in Appendix C.

# 2.6. STEP 4.3: UNIT RATES FOR CLOSURE COMPONENTS

The unit (Master) rates for each closure component is taken from the DMR 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:

January to December							upto June		
2005	2005 2006 2007 2008 2009 2010 2011 2012 2013							2014	
3.4%	4.6%	7.2%	11.5%	7.1%	4.3%	5.0%	5.6%	5.7%	3.1%

<sup>&</sup>lt;sup>3</sup> The Closure Components selected are in-line with the decommissioning and closure objectives detailed in Chapter 4 and 6 of the *Environmental Impact Assessment and Environmental Management Programme Amendment Report for the Proposed Construction and Operation of a Chrome Sand Drying Plant, Changes to the Tailings Dam Design and other Operational and Surface Infrastructure Changes (SLR Project T014-12, Report No. 2, August 2014), prepared for Tharisa Minerals (Pty) Ltd.* 

i.e. a total of 74.5% since January 2005 (i.e. 1.034 x 1.046 x 1.072 ... etc.).

No.	Description	Unit	Master Rate (at June 2014)	Multiplication Factor <sup>4</sup>
1	Dismantling of process plant & related structures (incl. overland conveyors & power lines)	m³	R 11.90	1.00
2 (A)	Demolition of steel buildings & structures	m²	R 165.74	1.00
2 (B)	Demolition of reinforced concrete buildings & structures	m²	R 244.25	1.00
3	Rehabilitation of access roads	m²	R 29.66	1.00
4 (A)	Demolition & rehabilitation of electrified railway lines	М	R 287.87	1.00
4 (B)	Demolition & rehabilitation of non electrified railway lines	М	R 157.02	1.00
5	Demolition of housing &/or administration facilities	m²	R 331.49	1.00
6	Opencast rehabilitation including final voids & ramps	На	R 168,709.21	0.52
7	Sealing of shafts, adits & inclines	Ha	R 88.98	1.00
8 (A)	Rehabilitation of overburden & spoils	На	R 115,845.83	1.00
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	На	R 144,283.88	1.00
8 (C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	На	R 419,068.79	0.80
9	Rehabilitation of subsided areas	На	R 97,003.43	1.00
10	General surface rehabilitation	На	R 91,769.43	1.00
11	River diversions	На	R 91,769.43	1.00
12	Fencing	М	R 104.68	1.00
13	Water management	На	R 34,893.32	0.67
14	2 to 3 years of maintenance & aftercare	На	R 12,212.66	1.00
15 (C)	Concrete slabs and light structures <sup>5</sup>	m²	R 154.13	1.00

# 2.7. STEP 4.4: WEIGHTING FACTORS TO BE USED

Weighting Factors based on the specific mine/process location are selected from the tables below.

Nature of the terrain/accessibility	Flat – Generally flat over the mine area	Undulating - A mix of sloped and undulating areas within the mine area	Rugged – Steep natural ground slopes (greater than 1:6) over the majority of the mine area
Weighting Factor 1	1.00	1.10	1.20

 $<sup>\</sup>overline{^{4}}$  Multiplication factor based on Risk Ranking = Class A and Environmental Sensitivity = Medium.

<sup>&</sup>lt;sup>5</sup> Additional component added. Rate based on SLR's experience with similar type projects and various consultations with demolition contractors and rehabilitation practitioners.

Proximity to urban area where goods and services are supplied	Urban – Within a developed urban area	Peri-urban – Less than 150 km from a developed urban area	Remote – Greater than 150 km from a developed urban area
Weighting Factor 2	1.00	1.05	1.10

#### 2.8. STEP 4.5: AREAS OF DISTURBANCE

The area of disturbance at Tharisa Mine is shown in Appendix A.

The current mining operations at Tharisa Mine, consists of an Eastern and Western portion, that already has the following infrastructure and mining related activities:

- East and West open pits,
- 100 ktpm chrome spiral plant and 300 ktpm platinum plant,
- Tailings storage facility (TSF 1),
- Eastern and central waste rock dumps,
- Access roads, haul roads and parking areas,
- Office and admin buildings,
- Laydown area and workshop,
- Topsoil stockpiles/berms.

Further details of the current liability for Tharisa Mine are detailed in the *Calculation of the Current Financial Closure Liability associated with Tharisa Mine as at 31 March 2014* (SLR Project 710.20002.00039, 31 March 2014).

Future infrastructure and developments, include:

- Chrome sand drying plant,
- North eastern and western waste rock dumps,
- Additional tailings storage facility, TSF 2,
- Stream diversion (that will remain post closure),
- Additional topsoil stockpiles/berms.

It is currently assumed that all plant infrastructure will be demolished and no handover of any facilities (for post closure use) has been allowed for.

Only the residential houses of the Maditlokwe community, the Tharisa Training Centre building, as well as, the low level bridge (for crossing the Sterkstroom river) and access road (12m haul road reduced to a width of 6m) are assumed to remain for post closure use. This issue still needs to formally agreed with the local municipality.

#### 2.9. STEP 4.6: IDENTIFY CLOSURE COSTS FROM SPECIALIST STUDIES

The risk ranking identifies what type of specialist studies should be carried out to ensure successful closure of the mine and/or process operation.

Risk Ranking	Specialist Studies
Class A (High risk)	Water pollution potential studies
	Overall quantified risk assessment
Class B (Medium risk)	<ul> <li>Screening level risk assessment</li> </ul>
Class C (Low risk)	

## 3. STEP 4.7: CALCULATE THE CLOSURE LIABILITY

The increase in the financial liability over the remaining life of mine is largely due to changes in the footprint area of the pits, waste rock dumps (WRD's) and TSF 2. These changes in footprint area are summarised in the table below.

Date	Year	Eas	t Pit	Wes	t Pit	TSF 2	Eastern	Central	North	Western
		Open	Back- filled	Open	Back- filled		WRD	WRD	East WRD	WRD
		(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)
Mar-14	Current	93.3	0	37.8	0	0	63.0	18.4	0	0
Jan-16	Year 1	104.6	0	39.8	0	46.0	78.0	52.5	0	0
Jan-17	Year 2	112.9	0	45.7	0	130.0	78.0	70.0	47.5	0
Jan-18	Year 3	117.4	1.9	48.8	0	130.0	78.0	70.0	62.0	24.0
Jan-19	Year 4	121.9	7.6	51.9	0	130.0	78.0	70.0	95.0	47.0
Jan-20	Year 5	105.3	32.9	57.1	0	130.0	78.0	70.0	95.0	58.0
Jan-21	Year 6	88.6	58.1	62.3	0	130.0	78.0	70.0	95.0	58.0
Jan-22	Year 7	86.6	67.9	57.5	11.5	130.0	78.0	70.0	95.0	58.0
Jan-23	Year 8	84.5	77.6	52.6	22.9	130.0	78.0	70.0	95.0	58.0
Jan-24	Year 9	83.8	83.8	57.1	28.4	130.0	78.0	70.0	95.0	58.0
Jan-25	Year 10	83.1	90.0	61.6	33.9	130.0	78.0	70.0	95.0	58.0
Mar-34	LOM	76.8	173.1	39.4	67.4	130.0	78.0	70.0	95.0	58.0

The anticipated ramp up in the financial closure liability at Tharisa Mine over the life of mine (at CV, as at August 2014) is summarised in the table below. The liability calculations are provided in Appendix B.

The financial closure liability associated with the unplanned closure of Tharisa Mine (as at January 2016) will be approximately R 145,471,638 (including VAT) – calculated at Current Value (CV) as at August 2014.

The financial closure liability associated with the planned closure of Tharisa Mine (as at LOM, March 2034) is anticipated to ramp up to approximately R 229,214,273 (CV including VAT).

Date	Year	Financial Liability incurred during the year (incl. VAT)	Progressive Financial Liability (incl. VAT)	Progressive Liability as a % of LOM Liability
Mar-14	Current	n/a	R 117,384,200	51.2 %
Jan-16	Year 1	R 28,087,438	R 145,471,638	63.5 %
Jan-17	Year 2	R 33,826,428	R 179,298,066	78.2 %
Jan-18	Year 3	R 8,623,513	R 187,921,579	82.0 %
Jan-19	Year 4	R 12,473,197	R 200,394,776	87.4 %
Jan-20	Year 5	R 4,196,150	R 204,590,926	89.3 %
Jan-21	Year 6	R 2,108,931	R 206,699,857	90.2 %
Jan-22	Year 7	R 2,218,723	R 208,918,580	91.1 %
Jan-23	Year 8	R 2,158,480	R 211,077,060	92.1 %
Jan-24	Year 9	R 2,344,214	R 213,421,274	93.1 %
Jan-25	Year 10	R 2,344,213	R 215,765,487	94.1 %
Mar-34	LOM	R 13,448,786	R 229,214,273	100.0 %

# 4. CONCLUSION

The financial closure liability for the unplanned closure of Tharisa Mine (as at January 2016) has been calculated to be approximately R 145,471,638 (CV including VAT) 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 (DMR).

The financial closure liability for the planned closure of Tharisa Mine (as at LOM, March 2034) is anticipated to ramp up to approximately R 229,214,273 (CV including VAT).

The calculated liabilities are considered to be Class 1 estimates (with an accuracy of between +25% and -15%) based on the overall generic approach as stipulated by the DMR Guideline Document.

The DMR Closure Components selected are in-line with the decommissioning and closure objectives detailed in Chapter 4 and 6 of the *Environmental Impact Assessment and Environmental Management Programme Amendment Report for the Proposed Construction and Operation of a Chrome Sand Drying Plant, Changes to the Tailings Dam Design and other Operational and Surface Infrastructure Changes* (SLR Project T014-12, Report No. 2, August 2014), prepared for Tharisa Minerals (Pty) Ltd.

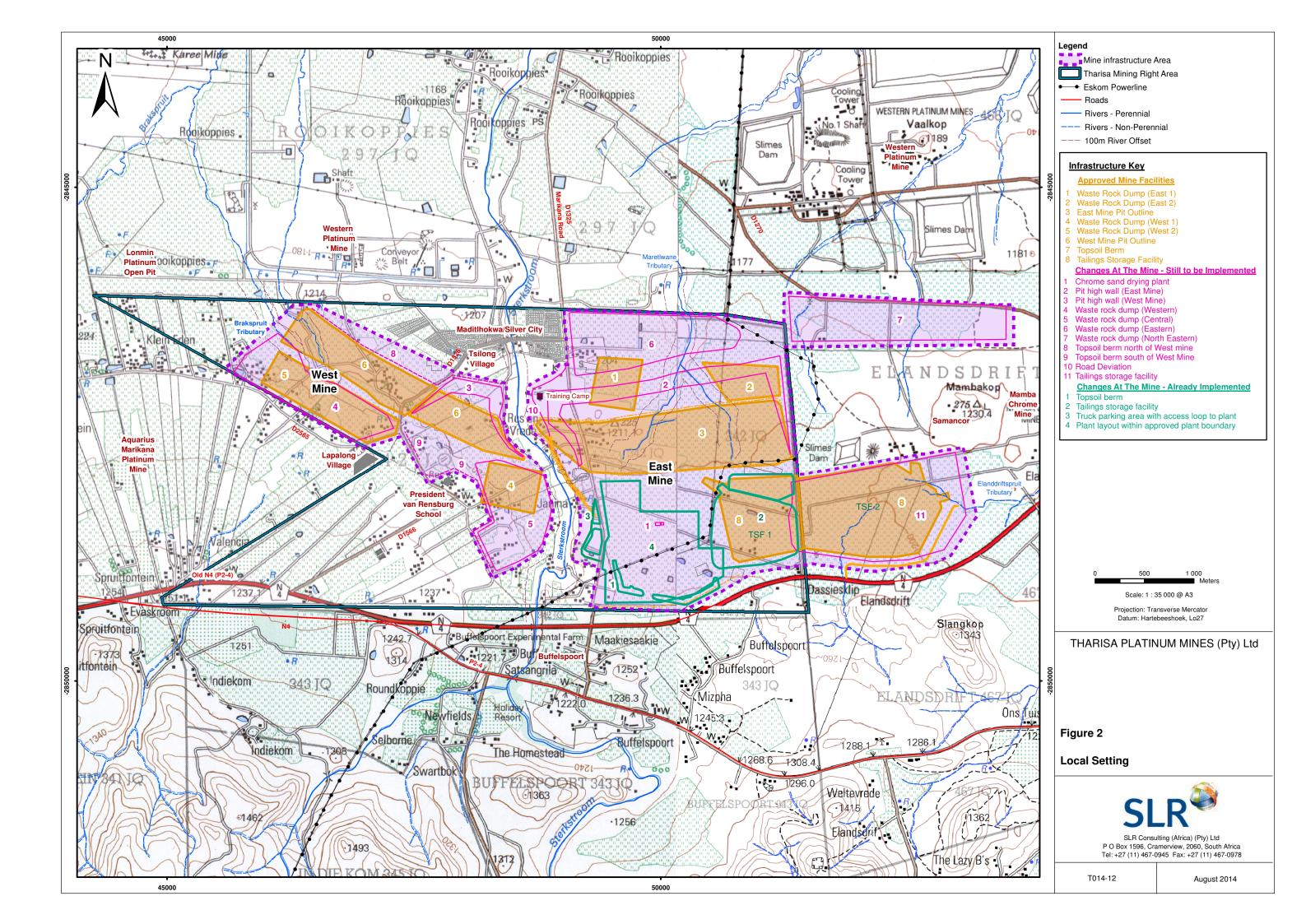
The financial closure liabilities only consider the routine costs associated with decommissioning of plant and infrastructure, the restoration of any environmental damage caused predominantly at the pre-production stage, the surface rehabilitation (shaping and vegetation) of waste deposits and material stockpiles, backfilling and/or making voids and open pits safe, and the maintenance and aftercare of all the rehabilitated sites.

Site specific aspects such as surface and groundwater remediation have not been costed at this stage – the likelihood of such remediation would only be identified during the ongoing operation of the mine through surface and groundwater monitoring and/or by carrying out risk assessment and water pollution potential studies. To date, there has been no indication that either surface or groundwater remediation will be required at Tharisa Mine.

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For SLR Consulting (Africa) (Pty) Ltd

APPENDIX A: Areas of Disturbance for Tharisa Mine



**APPENDIX B: Closure Liability for Tharisa Mine** 

			CALCULATION OF THE QUA	NTUM				
Vine:	Tharisa Mine							
valuators:	SLR Consulting (Pty) Ltd				Date:	Current Liability	r (Mar 2014)	
Risk Class:	High (Class A)				Escalation (	CPI): <b>74.5%</b>		
rea Sensitivity:	Medium (for Biophysical, Social	and Ec	onomic Criteria)	Terrai	n (Weighting	factor 1): 1.00	(Flat)	
				Proximit	v (Weiahtina	factor 2): 1.05	(Peri-Urban)	
					) (1101g.m.1g		(	
						-		
No.	Descriptions	Unit:	Onenstienel Area	A	B Master rate	C Multiplication	D Weighting	E=A*B*C*D Amount
NO.	Description:	Unit.	Operational Area	Quantity	Wasterrate	factor	factor 1	(Rands)
				Step 4.5	Step 4.3	Step 4.3	Step 4.4	(
1	Dismantling of processing plant &	m <sup>3</sup>	100 ktpm Plant	76558	R 11.90	. 1	1	R 910 934.7
	related structures (incl. overland	m <sup>3</sup>	300 ktpm Plant	191393	R 11.90	1	1	R 2 277 313.0
2 (4)	conveyors & power lines)		· ·					
2 (A)	Demolition of steel buildings & structures	m <sup>2</sup>	Fleet Parking Area 100 ktpm Plant	6658 4174	R 165.74 R 165.74	1	1	R 1 103 518.7 R 691 812.4
	Structures	m <sup>2</sup> m <sup>2</sup>	300 ktpm Plant	10435	R 165.74	1	1	R 1 729 531.0
2 (B)	Demolition of reinforced concrete	m <sup>2</sup>	100 ktpm Plant	6034	R 244.25	1	1	R 1 473 824.
2 (5)	buildings & structures	m <sup>2</sup>	300 ktpm Plant	15084	R 244.25	1	1	R 3 684 316.0
3	Rehabilitation of access roads	m <sup>2</sup>	Access and Haul Roads	223375	R 29.66	1	1	R 6 625 151.2
4 (A)	Demolition & rehabilitation of electrified	m	N/A	0	R 287.87	1	1	R 0.0
	railway lines		1.//a				ļļ_	
4 (B)	Demolition & rehabilitation of non electrified railway lines	m	N/A	0	R 157.02	1	1	R 0.0
5	electrified railway lines Demolition of housing &/or	m <sup>2</sup>	300 ktpm Plant	6549	R 331.49	1	1	R 2 170 905.4
3	administration facilities	in		0349	11 331.49		'	112 110 503.4
6	Opencast rehabilitation including final	ha	East Pit	93.3	R 168 709.21	0.52	1	R 8 185 095.9
	voids & ramps	ha	West Pit	37.8	R 168 709.21	0.52	1	R 3 316 148.2
7	Sealing of shafts, adits & inclines	m <sup>3</sup>	N/A	0	R 88.98	1	1	R 0.0
8 (A)	Rehabilitation of overburden & spoils	ha	Waste Rock Dumps near TSF 1	11.5	R 115 845.83	1	1	R 1 332 227.0
		ha	Eastern WRD	63.0		1	1	R 7 298 287.0
		ha	Central WRD	18.4	R 115 845.83	1	1	R 2 131 563.2
0 (5)		ha	ROM Stockpile Pad	19.0		1	1	R 2 201 070.7
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic,	ha ha	TSF 1 TSF 2	70.7	R 144 283.88 R 144 283.88	1	1	R 10 200 870.5 R 0.0
	salt producing waste)	ha	Dirty Water Dams	7.1	R 144 283.88 R 144 283.88	1	1	R 1 024 415.5
8 (C)	Rehabilitation of processing waste	ha	N/A	0	R 419 068.79	0.80	1	R 0.0
- (-)	deposits & evaporation ponds (acidic,							
	metal-rich waste)							
9	Rehabilitation of subsided areas	ha	N/A	0	R 97 003.43	1		R 0.0
10	General surface rehabilitation	ha	100 ktpm Plant	7.0	R 91 769.43	1		R 642 386.0
		ha	PGM Stockpile (at 100 ktpm plant)	7.3	R 91 769.43	1	1	R 669 916.8
		ha	Old IMEC area	7.9	R 91 769.43	1	1	R 724 978.5
		ha ha	Top Soil Stockpiles Norite Borrow Area	37.3	R 91 769.43 R 91 769.43	1	1	R 3 422 999.9 R 165 184.9
		ha	Haul Roads	22.4	R 91 769.43	1	1	R 2 055 635.3
		ha	300 ktpm Plant	19.4	R 91 769.43	1	1	R 1 780 327.0
		ha	Mobile Office Establishment	0.3	R 91 769.43	1	1	R 27 530.8
		ha	Laydown Area	1.5	R 91 769.43	1	1	R 137 654.1
		ha	Fleet Parking Area	13.3		1	1	R 1 220 533.4
11	River diversions (to be decommissioned)	ha	N/A	0	R 91 769.43	1	1	R 0.0
12	Fencing	m	N/A	0	R 104.68	1	1	R 0.0
13	Water management	ha	In-pit evaporation dams (10% of total	13.1	R 34 893.32	0.67	1	R 306 258.6
			pit area)					
14	2 to 3 years of maintenance & aftercare	ha	All Areas	450.7	R 12 212.66	1	1	R 5 504 246.9
15 (A)	Specialist study (Water pollution	Sum	All Areas	1	R 580 987.43	1	1	R 580 987.4
15 /P\	potential study) Specialist study (Overall quantified risk	S		A	D 249 E02 40	1	1	R 348 592.4
15 (B)	Specialist study (Overall quantified risk assessment)	Sum	All Areas	1	R 348 592.46	1		r 348 592.4
15 (C)	Concrete Slabs & Light Structures	m <sup>2</sup>	TSF Infrastructure	1 567	R 154.13	1	1	R 241 514.4
- (-/		m <sup>2</sup>	300 ktpm Plant	40 199		1	1	R 6 195 685.8
	•		• •				Subtotal 1	R 80 381 418.2
						(Sum of items	1 to 15 Above)	
								5 4 6 4 6 6 7 6
16	Multiply Subtotal 1 by Weighting Factor 2 (step 4.4)		5	5.0% of Subtot	aii			R 4 019 070.
	12 (310/ 4.4)						Subtotal 2	R 84 400 489.
					(Subto	tal 1 plus Weighting I		
17	Preliminary and general (P&G)		12	2.0 % of Subto	tal 2		0	R 10 128 058.
						(Subtotal 2 plus F	Subtotal 3	R 94 528 547.
						(Subiolai 2 pius F	ad item only)	
23	Contingency		1	0.0% of Subto	tal 2		T	R 8 440 048.
							Subtotal 4	R 102 968 596.
						(Subtotal 3 plus	s contingency)	
24	VAT			4.0% of Subto	tol 4	(Subtotal 3 plus	s contingency)	R 14 415 603.

Evaluators: Risk Class: Area Sensitivity: No. 1 2 (A) 2 (B) 3 4 (A) 4 (B) 5 6	Tharisa Mine SLR Consulting (Pty) Ltd High (Class A) Medium (for Biophysical, Social Description: Description: Dismantling of processing plant & related structures (incl. overland conveyors & power lines) Demolition of steel buildings & structures Demolition of reinforced concrete buildings & structures Rehabilitation of access roads Demolition & rehabilitation of non electrified railway lines Demolition of reinbuildities Opencast rehabilitation including final	and Ec Unit: m <sup>3</sup> m <sup>3</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup>	Conomic Criteria)  Operational Area  Operational Area  100 ktpm Plant  300 ktpm Plant  Fleet Parking Area  100 ktpm Plant  300 ktpm Plant  100 ktpm Plant  100 ktpm Plant  Chrome Plant  Access and Haul Roads	Proximit A Quantity Step 4.5 76558 191393 750 6658 4174 10435	Escalation (0 n (Weighting 1 y (Weighting 1 Master rate Step 4.3 R 11.90 R 11.90 R 11.90	factor 1): 1.00	6) (Flat) (Peri-Urban) Weighting factor 1 Step 4.4 1 1	E=A*B*C*D Amount (Rands) R 910 934.7 R 2 277 313.0
Lisk Class: Irea Sensitivity: No. 1 2 (A) 2 (B) 3 4 (A) 4 (B) 5 6	High (Class A) Medium (for Biophysical, Social Description: Dismantling of processing plant & related structures (incl. overland conveyors & power lines) Demolition of steel buildings & structures Demolition of reinforced concrete buildings & structures Rehabilitation of access roads Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition of notusing &/or administration facilities Opencast rehabilitation including final	Unit: m <sup>3</sup> m <sup>3</sup> m <sup>2</sup> m <sup>3</sup>	Operational Area Operational Area 100 ktpm Plant 300 ktpm Plant Chrome Plant Fleet Parking Area 100 ktpm Plant 300 ktpm Plant 100 ktpm Plant 300 ktpm Plant Chrome Plant Chrome Plant	Proximit A Quantity Step 4.5 76558 191393 750 6658 4174 10435	Escalation (0 n (Weighting 1 y (Weighting 1 Master rate Step 4.3 R 11.90 R 11.90 R 11.90	CPI): 74.5% factor 1): 1.00 factor 2): 1.05 C Multiplication factor	(Flat) (Peri-Urban) D Weighting factor 1	Amount (Rands) R 910 934.
No.           1           2 (A)           3           4 (A)           4 (B)           5           6	Medium (for Biophysical, Social Description: Dismantling of processing plant & related structures (incl. overland conveyors & power lines) Demolition of steel buildings & structures Demolition of reinforced concrete buildings & structures Rehabilitation of access roads Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition f reinforced concrete solution of non electrified railway lines Demolition f rehabilitation in con electrified railway lines Demolition facilities Opencast rehabilitation including final	Unit: m <sup>3</sup> m <sup>3</sup> m <sup>2</sup> m <sup>3</sup>	Operational Area Operational Area 100 ktpm Plant 300 ktpm Plant Chrome Plant Fleet Parking Area 100 ktpm Plant 300 ktpm Plant 100 ktpm Plant 300 ktpm Plant Chrome Plant Chrome Plant	Proximit A Quantity Step 4.5 76558 191393 750 6658 4174 10435	n (Weighting y (Weighting Master rate Step 4.3 R 11.90 R 11.90 R 11.90	factor 1): <b>1.00</b> factor 2): <b>1.05</b> C Multiplication factor	(Peri-Urban) D Weighting factor 1	Amount (Rands) R 910 934.
No.           1           2 (A)           3           4 (A)           4 (B)           5           6	Medium (for Biophysical, Social Description: Dismantling of processing plant & related structures (incl. overland conveyors & power lines) Demolition of steel buildings & structures Demolition of reinforced concrete buildings & structures Rehabilitation of access roads Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition f reinforced concrete solution of non electrified railway lines Demolition f rehabilitation in con electrified railway lines Demolition facilities Opencast rehabilitation including final	Unit: m <sup>3</sup> m <sup>3</sup> m <sup>2</sup> m <sup>3</sup>	Operational Area Operational Area 100 ktpm Plant 300 ktpm Plant Chrome Plant Fleet Parking Area 100 ktpm Plant 300 ktpm Plant 100 ktpm Plant 300 ktpm Plant Chrome Plant Chrome Plant	Proximit A Quantity Step 4.5 76558 191393 750 6658 4174 10435	8 Master rate Step 4.3 R 11.90 R 11.90 R 11.90	factor 2): 1.05 C Multiplication factor	(Peri-Urban) D Weighting factor 1	Amount (Rands) R 910 934.
No. 1 2 (A) 2 (B) 3 4 (A) 4 (B) 5 6	Description: Dismantling of processing plant & related structures (incl. overland conveyors & power lines) Demolition of steel buildings & structures Demolition of reinforced concrete buildings & structures Rehabilitation of access roads Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition for invising &/or administration facilities Opencast rehabilitation including final	Unit: m <sup>3</sup> m <sup>3</sup> m <sup>2</sup> m <sup>3</sup>	Operational Area Operational Area 100 ktpm Plant 300 ktpm Plant Chrome Plant Fleet Parking Area 100 ktpm Plant 300 ktpm Plant 100 ktpm Plant 300 ktpm Plant Chrome Plant Chrome Plant	Proximit A Quantity Step 4.5 76558 191393 750 6658 4174 10435	8 Master rate Step 4.3 R 11.90 R 11.90 R 11.90	factor 2): 1.05 C Multiplication factor	(Peri-Urban) D Weighting factor 1	Amount (Rands) R 910 934.
1 2 (A) 2 (B) 3 4 (A) 4 (B) 5 6	Dismantling of processing plant & related structures (incl. overland conveyors & power lines) Demolition of steel buildings & structures Demolition of reinforced concrete buildings & structures Rehabilitation of access roads Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition of housing &/or administration facilities Opencast rehabilitation including final	m <sup>3</sup> m <sup>3</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup>	100 ktpm Plant 300 ktpm Plant Chrome Plant Fleet Parking Area 100 ktpm Plant 300 ktpm Plant 100 ktpm Plant 300 ktpm Plant 300 ktpm Plant	A Quantity Step 4.5 76558 191393 750 6658 4174 10435	B Master rate Step 4.3 R 11.90 R 11.90 R 11.90	C Multiplication factor	D         E=A*B*C*D           Weighting factor 1         Amount (Rands)           Step 4.4         1           1         R 910 934.           1         R 2277 313.           1         R 8 923.           1         R 1 103 518.           1         R 1729 531.           1         R 1729 531.           1         R 1 729 531.           1         R 1 73 824.           1         R 1 729 531.           1         R 1 78 923.           1         R 1 78 924 425.           1         R 1 78 04 310.           1         R 1 78 027.           1         R 1 32 227.           1         R 1 32 227.           1         R 1 020 870.           1         R 1 020 870.           1         R 1 020 870.           1         R 1 024 415.           1         R 1 024 415.           1         R 1 024 415.     <	
1 2 (A) 2 (B) 3 4 (A) 4 (B) 5 6	Dismantling of processing plant & related structures (incl. overland conveyors & power lines) Demolition of steel buildings & structures Demolition of reinforced concrete buildings & structures Rehabilitation of access roads Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition of housing &/or administration facilities Opencast rehabilitation including final	m <sup>3</sup> m <sup>3</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup>	100 ktpm Plant 300 ktpm Plant Chrome Plant Fleet Parking Area 100 ktpm Plant 300 ktpm Plant 100 ktpm Plant 300 ktpm Plant 300 ktpm Plant	Quantity Step 4.5 76558 191393 750 6658 4174 10435	Master rate Step 4.3 R 11.90 R 11.90 R 11.90	Multiplication factor	Weighting factor 1	Amount (Rands) R 910 934.
1 2 (A) 2 (B) 3 4 (A) 4 (B) 5 6	Dismantling of processing plant & related structures (incl. overland conveyors & power lines) Demolition of steel buildings & structures Demolition of reinforced concrete buildings & structures Rehabilitation of access roads Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition of housing &/or administration facilities Opencast rehabilitation including final	m <sup>3</sup> m <sup>3</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup>	100 ktpm Plant 300 ktpm Plant Chrome Plant Fleet Parking Area 100 ktpm Plant 300 ktpm Plant 100 ktpm Plant 300 ktpm Plant 300 ktpm Plant	Quantity Step 4.5 76558 191393 750 6658 4174 10435	Master rate Step 4.3 R 11.90 R 11.90 R 11.90	Multiplication factor	Weighting factor 1	Amount (Rands) R 910 934.
1 2 (A) 2 (B) 3 4 (A) 4 (B) 5 6	Dismantling of processing plant & related structures (incl. overland conveyors & power lines) Demolition of steel buildings & structures Demolition of reinforced concrete buildings & structures Rehabilitation of access roads Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition of housing &/or administration facilities Opencast rehabilitation including final	m <sup>3</sup> m <sup>3</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup>	100 ktpm Plant 300 ktpm Plant Chrome Plant Fleet Parking Area 100 ktpm Plant 300 ktpm Plant 100 ktpm Plant 300 ktpm Plant 300 ktpm Plant	Step 4.5 76558 191393 750 6658 4174 10435	<b>Step 4.3</b> R 11.90 R 11.90 R 11.90	factor	factor 1	<b>(Rands)</b> R 910 934.
2 (A) 2 (B) 3 4 (A) 4 (B) 5 6	related structures (incl. overland conveyors & power lines) Demolition of steel buildings & structures Demolition of reinforced concrete buildings & structures Rehabilitation of access roads Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition of housing &/or administration facilities Opencast rehabilitation including final	m <sup>3</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup>	300 ktpm Plant Chrome Plant Fleet Parking Area 100 ktpm Plant 300 ktpm Plant 100 ktpm Plant 300 ktpm Plant Chrome Plant	76558 191393 750 6658 4174 10435	R 11.90 R 11.90 R 11.90	Step 4.3 1 1	Step 4.4 1 1	
2 (A) 2 (B) 3 4 (A) 4 (B) 5 6	related structures (incl. overland conveyors & power lines) Demolition of steel buildings & structures Demolition of reinforced concrete buildings & structures Rehabilitation of access roads Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition of housing &/or administration facilities Opencast rehabilitation including final	m <sup>3</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup>	300 ktpm Plant Chrome Plant Fleet Parking Area 100 ktpm Plant 300 ktpm Plant 100 ktpm Plant 300 ktpm Plant Chrome Plant	191393 750 6658 4174 10435	R 11.90 R 11.90	1 1 1	1	
2 (A) 2 (B) 3 4 (A) 4 (B) 5 6	conveyors & power lines) Demolition of steel buildings & structures Demolition of reinforced concrete buildings & structures Rehabilitation of access roads Demolition & rehabilitation of non electrified railway lines Demolition of nousing &/or administration facilities Opencast rehabilitation including final	m <sup>3</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m	Chrome Plant Fleet Parking Area 100 ktpm Plant 300 ktpm Plant 100 ktpm Plant 300 ktpm Plant Chrome Plant	750 6658 4174 10435	R 11.90	1	1	R 2 277 313 (
2 (B) 3 4 (A) 4 (B) 5 6	structures Demolition of reinforced concrete buildings & structures Rehabilitation of access roads Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition of housing &/or administration facilities Opencast rehabilitation including final	m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m	Fleet Parking Area 100 ktpm Plant 300 ktpm Plant 100 ktpm Plant 300 ktpm Plant Chrome Plant	6658 4174 10435		1		
2 (B) 3 4 (A) 4 (B) 5 6	structures Demolition of reinforced concrete buildings & structures Rehabilitation of access roads Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition of housing &/or administration facilities Opencast rehabilitation including final	m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m	100 ktpm Plant         300 ktpm Plant         100 ktpm Plant         300 ktpm Plant         Chrome Plant	4174 10435	D 405 74	•	1	R 8 923.
2 (B) 3 4 (A) 4 (B) 5 6	Demolition of reinforced concrete buildings & structures Rehabilitation of access roads Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition of housing &/or administration facilities Opencast rehabilitation including final	m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m	300 ktpm Plant 100 ktpm Plant 300 ktpm Plant Chrome Plant	10435	R 165.74	1	1	R 1 103 518.
3 4 (A) 4 (B) 5 6	buildings & structures Rehabilitation of access roads Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition of housing &/or administration facilities Opencast rehabilitation including final	m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m	100 ktpm Plant 300 ktpm Plant Chrome Plant		R 165.74	1	-	R 691 812.
3 4 (A) 4 (B) 5 6	buildings & structures Rehabilitation of access roads Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition of housing &/or administration facilities Opencast rehabilitation including final	m <sup>2</sup> m <sup>2</sup> m <sup>2</sup> m	300 ktpm Plant Chrome Plant	6034	R 165.74 R 244.25	1	-	
3 4 (A) 4 (B) 5 6	Rehabilitation of access roads Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition of housing &/or administration facilities Opencast rehabilitation including final	m² m² m	Chrome Plant	15084	R 244.25 R 244.25	1		
4 (A) 4 (B) 5 6	Demolition & rehabilitation of electrified railway lines Demolition & rehabilitation of non electrified railway lines Demolition of housing &/or administration facilities Opencast rehabilitation including final	m	Access and Haul Roads	100	R 244.25	1	1	R 24 425.
4 (B) 5 6	railway lines Demolition & rehabilitation of non electrified railway lines Demolition of housing &/or administration facilities Opencast rehabilitation including final		1	223375	R 29.66	1	-	R 6 625 151.
5	Demolition & rehabilitation of non electrified railway lines Demolition of housing &/or administration facilities Opencast rehabilitation including final	m	N/A	0	R 287.87	1	1	R 0.
5	electrified railway lines Demolition of housing &/or administration facilities Opencast rehabilitation including final		N/A	0	R 157.02	1	1	R 0.
6	administration facilities Opencast rehabilitation including final							
	Opencast rehabilitation including final	m²	300 ktpm Plant	6549	R 331.49	1	1	R 2 170 905.
		ha	East Pit	104.6	R 168 709.21	0.52	1	R 9 176 431.
7	voids & ramps	ha	West Pit	39.8	R 168 709.21	0.52	1	R 3 491 605.
1	Sealing of shafts, adits & inclines	m <sup>3</sup>	N/A	0	R 88.98	1	1	R 0.
8 (A)	Rehabilitation of overburden & spoils	ha	Waste Rock Dumps near TSF 1	11.5	R 115 845.83	1		R 1 332 227.
		ha	Eastern WRD	78.0	R 115 845.83	1		
		ha ha	Central WRD North East WRD	52.5 0.0	R 115 845.83 R 115 845.83	1		
		ha	Western WRD	0.0	R 115 845.83	1	-	
		ha	ROM Stockpile Pad	19.0	R 115 845.83	1		R 2 201 070.
	Rehabilitation of processing waste	ha	TSF 1	70.7	R 144 283.88	1		
	deposits & evaporation ponds (basic, salt producing waste)	ha ha	TSF 2 Dirty Water Dams	46.0	R 144 283.88 R 144 283.88	1		
	Rehabilitation of processing waste	ha	N/A	0	R 419 068.79	0.80		R 0.
	deposits & evaporation ponds (acidic,							
	metal-rich waste) Rehabilitation of subsided areas	ha	N/A	0	R 97 003.43	1	1	RO
	General surface rehabilitation	ha	100 ktpm Plant	7.0	R 91 769.43	1		
10		ha	PGM Stockpile (at 100 ktpm plant)	7.3	R 91 769.43	1		R 669 916.
		ha	Old IMEC area	7.9	R 91 769.43	1	1	R 724 978.
		ha	Top Soil Stockpiles	37.3	R 91 769.43	1		R 3 422 999.
		ha ha	Norite Borrow Area Haul Roads	1.8	R 91 769.43 R 91 769.43	1	1	
		ha	300 ktpm Plant	19.4		1	1	
		ha	Mobile Office Establishment	0.3	R 91 769.43	1	1	R 27 530.
		ha	Laydown Area	1.5		1	-	R 137 654.
		ha	Fleet Parking Area East Pit (Backfilled area)	13.3 0.0	R 419 068.79 R 91 769.43	1	-	
		ha ha	West Pit (Backfilled area)	0.0	R 91 769.43 R 91 769.43	1		
11	River diversions (to be decommissioned)	ha	N/A	0	R 91 769.43	1		R 0.
12	Fencing	m	N/A	0	R 104.68	1	1	R 0.
13	Water management	ha	In-pit evaporation dams (10% of total	14.4	R 34 893.32	0.67	1	R 337 585.
			pit area)					
14	2 to 3 years of maintenance & aftercare	ha	All Areas	559.1	R 12 212.66	1	1	R 6 828 099.
15 (A)	Specialist study (Water pollution potential study)	Sum	All Areas	1	R 580 987.43	1	1	R 580 987.
15 (B)	Specialist study (Overall quantified risk	Sum	All Areas	1	R 348 592.46	1	1	R 348 592.
	assessment)					-		
15 (C)	Concrete Slabs & Light Structures	m <sup>2</sup>	TSF Infrastructure	1 567	R 154.13	1	1	R 241 514.
	11	m²	300 ktpm Plant	40 199	R 154.13	1	1 Subtotal 1	R 6 195 685. R 99 614 910.
						(Sum of items		
	Multiply Subtotal 1 by Weighting Factor 2 (step 4.4)		5	.0% of Subtot	ai 1			R 4 980 745
		r					Subtotal 2	R 104 595 655.
					(Subto	al 1 plus Weighting F	actor 2 value)	
17	Preliminany and concret (DPO)			0 % of 5	tal 2		I	D 10 551 470
17	Preliminary and general (P&G)	1	12	2.0 % of Subto	nal Z		Subtotal 3	R 12 551 478 R 117 147 134
						(Subtotal 2 plus P		
00	Contingonov			0.00/ ~ 0	tal 2			D 40 450 505
23	Contingency	1	10	0.0% of Subto	ıal∠		Subtotal 4	R 10 459 565. R 127 606 700.
						(Subtotal 3 plus		
				1.00/ 1.0	-1.4	· · · ·		D 17 00 1 01
24	VAT		14	4.0% of Subto	tal 4	~	RAND TOTAL	R 17 864 938 R 145 471 638

			CALCULATION OF THE QUA	NTUM				
/line:	Tharisa Mine		CALCOLATION OF THE QUA					
valuators:	SLR Consulting (Pty) Ltd				Date:	Year 2 (Jan 2017	7)	
						<b>(</b> 111)	,	
Risk Class:	High (Class A)				Escalation (	CPI): 74.5%		
Area Sensitivity:	Medium (for Biophysical, Social	and Ec	onomic Criteria)	Terrai	n (Weighting	factor 1): 1.00	(Flat)	
-			,				. ,	
				FIOXIMI	y (weighung	factor 2): 1.05	(Peri-Urban)	
	<b>D</b>			A	В	С	D	E=A*B*C*D
No.	Description:	Unit:	Operational Area	Quantity	Master rate	Multiplication factor	Weighting factor 1	Amount (Rands)
				Step 4.5	Step 4.3	Step 4.3	Step 4.4	(Ranus)
1	Dismantling of processing plant &	m <sup>3</sup>	100 ktpm Plant	76558	R 11.90	1	1	R 910 934.
	related structures (incl. overland	m <sup>3</sup>	300 ktpm Plant	191393	R 11.90	1	1	R 2 277 313.
	conveyors & power lines)		Chrome Plant	750	R 11.90	1	1	R 8 923.
		m <sup>3</sup>				1		
2 (A)	Demolition of steel buildings & structures	2	Fleet Parking Area	6658	R 165.74	1	1	R 1 103 518.
	Siluciules	m <sup>2</sup>	100 ktpm Plant 300 ktpm Plant	4174 10435	R 165.74 R 165.74	1	1	R 691 812. R 1 729 531.
2 (B)	Demolition of reinforced concrete	 m <sup>2</sup>	100 ktpm Plant	6034	R 244.25	1	1	R 1 473 824.
2 (2)	buildings & structures	m <sup>2</sup>	300 ktpm Plant	15084	R 244.25	1	1	R 3 684 316.
		m <sup>2</sup>	Chrome Plant	100	R 244.25	1	1	R 24 425.
3	Rehabilitation of access roads	m²	Access and Haul Roads	223375	R 29.66	1	1	R 6 625 151.
4 (A)	Demolition & rehabilitation of electrified	m	N/A	0	R 287.87	1	1	R 0.
4 (B)	railway lines Demolition & rehabilitation of non	m	N/A	0	R 157.02	1	1	R 0.
- (D)	electrified railway lines	m		0	131.02	1	I.	K U.
5	Demolition of housing &/or	m²	300 ktpm Plant	6549	R 331.49	1	1	R 2 170 905.
6	administration facilities	he	East Dit	440.0	D 169 700 01	0.50		D 0 004 500
6	Opencast rehabilitation including final voids & ramps	ha ha	East Pit West Pit	112.9 45.7	R 168 709.21 R 168 709.21	0.52	1	R 9 904 580. R 4 009 205.
7	Sealing of shafts, adits & inclines	m <sup>3</sup>	N/A	45.7	R 88.98	0.32	1	R 4 009 205.
8 (A)	Rehabilitation of overburden & spoils	ha	Waste Rock Dumps near TSF 1	11.5		1	1	R 1 332 227.
0 (, , )		ha	Eastern WRD	78.0		1	1	R 9 035 974.
		ha	Central WRD	70.0	R 115 845.83	1	1	R 8 109 207.
		ha	North East WRD	47.5	R 115 845.83	1	1	R 5 502 676.
		ha	Western WRD	0.0	R 115 845.83	1	1	R 0.
0 (D)	Dababilitation of announcing works	ha	ROM Stockpile Pad	19.0		1	1	R 2 201 070.
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic,	ha ha	TSF 1 TSF 2	70.7		1	1	R 10 200 870. R 18 756 904.
	salt producing waste)	ha	Dirty Water Dams	7.1	R 144 283.88	1	1	R 1 024 415.
8 (C)	Rehabilitation of processing waste	ha	N/A	0	R 419 068.79	0.80	1	R 0.
	deposits & evaporation ponds (acidic,							
9	metal-rich waste) Rehabilitation of subsided areas	ha	N/A	0	R 97 003.43	1	1	R 0.
10	General surface rehabilitation	ha	100 ktpm Plant	7.0		1	1	R 642 386.
10		ha	PGM Stockpile (at 100 ktpm plant)	7.3	R 91 769.43	1	1	R 669 916.
		ha	Old IMEC area	7.9	R 91 769.43	1	1	R 724 978.
		ha	Top Soil Stockpiles	37.3	R 91 769.43	1	1	R 3 422 999.
		ha	Norite Borrow Area	1.8		1	1	R 165 184.
		ha	Haul Roads	22.4	R 91 769.43	1	1	R 2 055 635.
		ha ha	300 ktpm Plant Mobile Office Establishment	19.4 0.3		1	1	R 1 780 327. R 27 530.
		ha	Laydown Area	1.5		1	-	R 137 654.
		ha	Fleet Parking Area	13.3		1	1	R 5 573 614.
		ha	East Pit (Backfilled area)	0.0	R 91 769.43	1	1	R 0.
		ha	West Pit (Backfilled area)	0.0		1	1	R 0.
11	River diversions (to be decommissioned)	ha	N/A	0		1	1	R 0.
12	Fencing	m	N/A	0	R 104.68	1	1	R 0.
13	Water management	ha	In-pit evaporation dams (10% of total	15.9	R 34 893.32	0.67	1	R 370 783.
			pit area)		D (0.012.01			D 0 001 011
14	2 to 3 years of maintenance & aftercare	ha	All Areas	722.3	R 12 212.66	1	1	R 8 821 206.
15 (A)	Specialist study (Water pollution potential study)	Sum	All Areas	1	R 580 987.43	1	1	R 580 987.
15 (B)	Specialist study (Overall quantified risk	Sum	All Areas	1	R 348 592.46	1	1	R 348 592.
- \-/	assessment)							
15 (C)	Concrete Slabs & Light Structures	m <sup>2</sup>	TSF Infrastructure	3 134	R 154.13	1	1	R 483 028.
		m²	300 ktpm Plant	40 199	R 154.13	1	1	R 6 195 685
						(Sum of items	Subtotal 1 1 to 15 Above)	R 122 778 302
						Count of items		
16	Multiply Subtotal 1 by Weighting Factor		5	5.0% of Subtot	al 1			R 6 138 915
	2 (step 4.4)						Public Lo	D 400 017 017
					(Subto	tal 1 plus Weighting F	Subtotal 2 actor 2 value)	R 128 917 217
					ເວັນນີ້ໄປ	i proo welginning r	autor 2 value	
17	Preliminary and general (P&G)		12	2.0 % of Subto	otal 2			R 15 470 066
							Subtotal 3	R 144 387 283
						(Subtotal 2 plus P	&G item only)	
23	Contingency		11	0.0% of Subto	tal 2			R 12 891 721
							Subtotal 4	R 157 279 005
						(Subtotal 3 plus	s contingency)	
24	VAT		4	1 0% of Cube-	tal 4			R 22 019 060
24	VAT		1.	4.0% of Subto	ıal 4	C	RAND TOTAL	R 22 019 060 R 179 298 066
							al 4 plus VAT)	

			CALCULATION OF THE QUA	NTUM				
line:	Tharisa Mine							
valuators:	SLR Consulting (Pty) Ltd				Date:	Year 3 (Jan 201	8)	
isk Class:	High (Class A)				Escolation (	CPI): 74.5%		
	High (Class A)				Escalation (0	,		
rea Sensitivity:	Medium (for Biophysical, Social	and Ec	onomic Criteria)	Terrai	n (Weighting	factor 1): 1.00	(Flat)	
				Proximit	y (Weighting	factor 2): 1.05	(Peri-Urban)	
				Α	В	С	D	E=A*B*C*D
No.	Description:	Unit:	Operational Area	Quantity	Master rate	Multiplication factor	Weighting factor 1	Amount (Rands)
				Step 4.5	Step 4.3	Step 4.3	Step 4.4	(riana)
1	Dismantling of processing plant &	m <sup>3</sup>	100 ktpm Plant	76558	R 11.90	1	1	R 910 934
	related structures (incl. overland conveyors & power lines)	m <sup>3</sup>	300 ktpm Plant	191393	R 11.90	1	1	R 2 277 313
		m <sup>3</sup>	Chrome Plant	750	R 11.90	1	1	R 8 923
2 (A)	Demolition of steel buildings &	m <sup>2</sup>	Fleet Parking Area	6658	R 165.74	1	1	R 1 103 518
- (**)	structures	m <sup>2</sup>	100 ktpm Plant	4174	R 165.74	1	1	R 691 812
		m <sup>2</sup>	300 ktpm Plant	10435	R 165.74	1	1	R 1 729 531
2 (B)	Demolition of reinforced concrete	m²	100 ktpm Plant	6034	R 244.25	1	1	R 1 473 824
	buildings & structures	m²	300 ktpm Plant	15084	R 244.25	1	1	R 3 684 316
3	Rehabilitation of access roads	m <sup>2</sup>	Chrome Plant Access and Haul Roads	100 223375	R 244.25 R 29.66	1	1	R 24 425 R 6 625 151
4 (A)	Demolition & rehabilitation of electrified	^2 	N/A	223375		1	1	R 0 025 151
	railway lines							
4 (B)	Demolition & rehabilitation of non	m	N/A	0	R 157.02	1	1	R
5	electrified railway lines Demolition of housing &/or	m <sup>2</sup>	300 ktpm Plant	6549	R 331.49	1	1	R 2 170 905
-	administration facilities					'		
6	Opencast rehabilitation including final	ha	East Pit	117.4		0.52	1	R 10 299 359
	voids & ramps	ha	West Pit	48.8		0.52	1	R 4 281 164
7	Sealing of shafts, adits & inclines Rehabilitation of overburden & spoils	m <sup>3</sup>	N/A Waste Rock Dumps near TSF 1	0 11.5		1	1	R ( R 1 332 227
8 (A)	Rehabilitation of overburden & spoils	ha ha	Eastern WRD	78.0		1	1	R 1 332 227 R 9 035 974
		ha	Central WRD	70.0		1	1	R 8 109 207
		ha	North East WRD	62.0		1	1	R 7 182 441
		ha	Western WRD	24.0		1	1	R 2 780 299
8 (B)	Dehabilitation of processing wasts	ha	ROM Stockpile Pad	19.0		1	1	R 2 201 070 R 10 200 870
0 (D)	Rehabilitation of processing waste deposits & evaporation ponds (basic,	ha ha	TSF 1 TSF 2	70.7		1	1	R 18 756 904
	salt producing waste)	ha	Dirty Water Dams	7.1		1		R 1 024 415
8 (C)	Rehabilitation of processing waste	ha	N/A	0	R 419 068.79	0.80	1	R
	deposits & evaporation ponds (acidic, metal-rich waste)							
9	Rehabilitation of subsided areas	ha	N/A	0	R 97 003.43	1	1	R
10	General surface rehabilitation	ha	100 ktpm Plant	7.0	R 91 769.43	1	1	R 642 386
		ha	PGM Stockpile (at 100 ktpm plant)	7.3	R 91 769.43	1	1	R 669 916
		ha	Old IMEC area	7.9	R 91 769.43	1	1	R 724 978
		ha ha	Top Soil Stockpiles Norite Borrow Area	37.3	R 91 769.43 R 91 769.43	1	1	R 3 422 999 R 165 184
		ha	Haul Roads	22.4		1	1	R 2 055 635
		ha	300 ktpm Plant	19.4		1	1	R 1 780 327
		ha	Mobile Office Establishment	0.3		1	1	R 27 530
		ha	Laydown Area	1.5		1	1	R 137 654
		ha ha	Fleet Parking Area East Pit (Backfilled area)	13.3 1.9	R 419 068.79 R 91 769.43	1	1	R 5 573 614 R 174 361
		ha	West Pit (Backfilled area)	0.0		1	1	R 174 36
11	River diversions (to be decommissioned)	ha	N/A	0.0	R 91 769.43	1	1	R
12	Fencing	m	N/A	0	R 104.68	1	1	R
13	Water management	ha	In-pit evaporation dams (10% of total	16.6	R 34 893.32	0.67	1	R 388 551
			pit area)					
14	2 to 3 years of maintenance & aftercare	ha	All Areas	770.3	R 12 212.66	1	1	R 9 407 413
15 (A)	Specialist study (Water pollution	Sum	All Areas	1	R 580 987.43	1	1	R 580 987
15 (B)	potential study) Specialist study (Overall quantified risk	Sum	All Areas	1	R 348 592.46	1	1	R 348 592
	assessment)							
15 (C)	Concrete Slabs & Light Structures	m <sup>2</sup>	TSF Infrastructure	3 134	R 154.13	1	1	R 483 028
		m²	300 ktpm Plant	40 199	R 154.13	1	1 Subtotal 1	R 6 195 685 R 128 683 443
						(Sum of items		11 120 003 44
16	Multiply Subtotal 1 by Weighting Factor		5	.0% of Subtot	al 1			R 6 434 17
	2 (step 4.4)						Subtotal 2	R 135 117 61
					(Subto	tal 1 plus Weighting		
17	Preliminary and general (P&G)		12	2.0 % of Subto	ital 2		Subtotal 3	R 16 214 113 R 151 331 72
						(Subtotal 2 plus F		101 001 72
23	Contingency		1	0.0% of Subto	tal 2		Out to the	R 13 511 76
						(Subtotal 3 plu	Subtotal 4 s contingency)	R 164 843 49
							- somingonoy/	
24	VAT		1	4.0% of Subto	tal 4			R 23 078 08
						G	RAND TOTAL	R 187 921 57

line:	Theries Mine		CALCULATION OF THE QUA	NTUM				
valuators:	Tharisa Mine				Date:	Veer 4 / Jon 2010		
valualors.	SLR Consulting (Pty) Ltd				Dale.	Year 4 (Jan 2019	<i>)</i> )	
isk Class:	High (Class A)				Escalation (	CPI): 74.5%		
rea Sensitivity:	Medium (for Biophysical, Social	and Ec	onomic Criteria)	Terrai	n (Weighting	factor 1): 1.00	(Flat)	
,			,,			,	. ,	
				FIOXIMI	y (weighung	factor 2): 1.05	(Peri-Urban)	
			1		<b>_</b>	<u>^</u>		F 4+D+0+D
No.	Description:	Unit:	Operational Area	A Quantitv	B Master rate	C Multiplication	D Weighting	E=A*B*C*D Amount
10.	Description	onit.	operational Area	Quantity	Musici iute	factor	factor 1	(Rands)
				Step 4.5	Step 4.3	Step 4.3	Step 4.4	
1	Dismantling of processing plant & related structures (incl. overland	m <sup>3</sup>	100 ktpm Plant	76558	R 11.90	1	1	R 910 934.
	conveyors & power lines)	m <sup>3</sup>	300 ktpm Plant	191393	R 11.90	1	1	R 2 277 313.
		m <sup>3</sup>	Chrome Plant	750	R 11.90	1	1	R 8 923.
2 (A)	Demolition of steel buildings &	m <sup>2</sup>	Fleet Parking Area	6658	R 165.74	1	1	R 1 103 518.
	structures	m²	100 ktpm Plant	4174	R 165.74	1	1	R 691 812.
		m²	300 ktpm Plant	10435	R 165.74	1	1	R 1 729 531.
2 (B)	Demolition of reinforced concrete	m <sup>2</sup>	100 ktpm Plant	6034	R 244.25	1	1	R 1 473 824.
	buildings & structures	m <sup>2</sup>	300 ktpm Plant Chrome Plant	15084 100	R 244.25 R 244.25	1	1	R 3 684 316. R 24 425.
3	Rehabilitation of access roads	m m <sup>2</sup>	Access and Haul Roads	223375	R 29.66	1	1	R 6 625 151.
4 (A)	Demolition & rehabilitation of electrified	m	N/A	0	R 287.87	1	1	R 0.
4.153	railway lines	<u> </u>	A1/A					
4 (B)	Demolition & rehabilitation of non electrified railway lines	m	N/A	0	R 157.02	1	1	R 0.
5	Demolition of housing &/or	m <sup>2</sup>	300 ktpm Plant	6549	R 331.49	1	1	R 2 170 905.
	administration facilities							
6	Opencast rehabilitation including final	ha	East Pit	121.9		0.52	1	R 10 694 139.
	voids & ramps	ha	West Pit	51.9	R 168 709.21	0.52	1	R 4 553 124.
7	Sealing of shafts, adits & inclines	m <sup>3</sup>	N/A	0	R 88.98 R 115 845.83	1	1	R 0.
8 (A)	Rehabilitation of overburden & spoils	ha ha	Waste Rock Dumps near TSF 1 Eastern WRD	11.5 78.0		1	1	R 1 332 227. R 9 035 974.
		ha	Central WRD	70.0		1	1	R 8 109 207.
		ha	North East WRD	95.0	R 115 845.83	1	1	R 11 005 353.
		ha	Western WRD	47.0		1	1	R 5 444 753.
8 (B)	Rehabilitation of processing waste	ha ha	ROM Stockpile Pad TSF 1	19.0 70.7	R 115 845.83 R 144 283.88	1	1	R 2 201 070. R 10 200 870.
8 (B)	deposits & evaporation ponds (basic,	ha	TSF 2	130.0		1	1	R 18 756 904.
	salt producing waste)	ha	Dirty Water Dams	7.1	R 144 283.88	1	1	R 1 024 415.
8 (C)	Rehabilitation of processing waste	ha	N/A	0	R 419 068.79	0.80	1	R 0.0
	deposits & evaporation ponds (acidic, metal-rich waste)							
9	Rehabilitation of subsided areas	ha	N/A	0	R 97 003.43	1	1	R 0.
10	General surface rehabilitation	ha	100 ktpm Plant	7.0	R 91 769.43	1	1	R 642 386.
		ha	PGM Stockpile (at 100 ktpm plant)	7.3	R 91 769.43	1	1	R 669 916.
		ha	Old IMEC area	7.9	R 91 769.43	1	1	R 724 978.
		ha	Top Soil Stockpiles Norite Borrow Area	37.3	R 91 769.43 R 91 769.43	1	1	R 3 422 999. R 165 184.
		ha ha	Haul Roads	22.4	R 91 769.43 R 91 769.43	1	1	R 2 055 635.
		ha	300 ktpm Plant	19.4		1	1	R 1 780 327.
		ha	Mobile Office Establishment	0.3	R 91 769.43	1	1	R 27 530.
		ha	Laydown Area	1.5		1	1	R 137 654.
		ha	Fleet Parking Area East Pit (Backfilled area)	13.3 7.6	R 419 068.79 R 91 769.43	1	1	R 5 573 614. R 697 447.
		ha ha	West Pit (Backfilled area)	0.0		1	1	R 697 447. R 0.
11	River diversions (to be decommissioned)	ha	N/A	0.0	R 91 769.43	1	1	R 0.
12	Fencing	m	N/A	0	R 104.68	1	1	R 0.
13	Water management	ha	In-pit evaporation dams (10% of total	17.4	R 34 893.32	0.67	1	R 406 318.
			pit area)					
14	2 to 3 years of maintenance & aftercare	ha	All Areas	839.6	R 12 212.66	1	1	R 10 253 751.
15 (A)	Specialist study (Water pollution	Sum	All Areas	1	R 580 987.43	1	1	R 580 987.
15 (P)	potential study)	Q			D 240 502 40		4	D 340 500
15 (B)	Specialist study (Overall quantified risk assessment)	Sum	All Areas	1	R 348 592.46	1	1	R 348 592.
15 (C)	Concrete Slabs & Light Structures	m <sup>2</sup>	TSF Infrastructure	3 134	R 154.13	1	1	R 483 028.
		m²	300 ktpm Plant	40 199		1	1	R 6 195 685.
						(0)	Subtotal 1	R 137 224 739.
						(Sum of items	I LU IO ADOVE)	
16	Multiply Subtotal 1 by Weighting Factor		5	.0% of Subtot	al 1			R 6 861 236
	2 (step 4.4)							D 4 1 4 7 7 7 7 7
					(Cubto	tal 1 plus Weighting F	Subtotal 2 Factor 2 value)	R 144 085 976
					(Subto	tai i pius weighting f	actor 2 Value)	
17	Preliminary and general (P&G)		12	2.0 % of Subto	otal 2			R 17 290 317
						(0.1	Subtotal 3	R 161 376 293
						(Subtotal 2 plus P	'&G item only)	
23	Contingency		1	0.0% of Subto	tal 2			R 14 408 597
							Subtotal 4	R 175 784 890
						(Subtotal 3 plus	s contingency)	
24	VAT		1.	4.0% of Subto	tal 4			R 24 609 884
	•					G	RAND TOTAL	R 200 394 775

			CALCULATION OF THE QUA	NTUM				
ine:	Tharisa Mine							
aluators:	SLR Consulting (Pty) Ltd				Date:	Year 5 (Jan 2020	))	
sk Class:	High (Class A)				Escalation (0	CPI): 74.5%		
rea Sensitivity:	Medium (for Biophysical, Social	and Ec	onomic Criteria)	Terrai	n (Weighting	factor 1): 1.00	(Flat)	
				Proximit	y (Weighting	factor 2): 1.05	(Peri-Urban)	
				Α	В	с	D	E=A*B*C*D
No.	Description:	Unit:	Operational Area	Quantity	Master rate	Multiplication	Weighting	Amount
				•		factor	factor 1	(Rands)
				Step 4.5	Step 4.3	Step 4.3	Step 4.4	
1	Dismantling of processing plant & related structures (incl. overland	m <sup>3</sup>	100 ktpm Plant	76558	R 11.90	1	1	R 910 934
	conveyors & power lines)	m <sup>3</sup>	300 ktpm Plant	191393	R 11.90	1	1	R 2 277 313
		m <sup>3</sup>	Chrome Plant	750	R 11.90	1	1	R 8 923
2 (A)	Demolition of steel buildings &	m <sup>2</sup>	Fleet Parking Area	6658	R 165.74	1	1	R 1 103 518
( )	structures	m <sup>2</sup>	100 ktpm Plant	4174	R 165.74	1	1	R 691 812
		m <sup>2</sup>	300 ktpm Plant	10435	R 165.74	1	1	R 1 729 531
2 (B)	Demolition of reinforced concrete	m²	100 ktpm Plant	6034	R 244.25	1	1	R 1 473 824
	buildings & structures	m <sup>2</sup>	300 ktpm Plant	15084	R 244.25	1	1	R 3 684 316
0	Databilitation of access and	m <sup>2</sup>	Chrome Plant	100	R 244.25	1	1	R 24 425
3 4 (A)	Rehabilitation of access roads Demolition & rehabilitation of electrified	^2 	Access and Haul Roads N/A	223375	R 29.66 R 287.87	1	1	R 6 625 151 R 0
	railway lines			0				
4 (B)	Demolition & rehabilitation of non	m	N/A	0	R 157.02	1	1	R 0
5	electrified railway lines	2	300 ktpm Plant	6549	R 331.49		1	R 2 170 905
ə	Demolition of housing &/or administration facilities	m²	Soo kipin mani	6549	R 331.49	1	1	R 2 170 905
6	Opencast rehabilitation including final	ha	East Pit	105.3	R 168 709.21	0.52	1	R 9 237 841
	voids & ramps	ha	West Pit	57.1	R 168 709.21	0.52	1	R 5 009 313
7	Sealing of shafts, adits & inclines	m <sup>3</sup>	N/A	0	R 88.98	1	1	R 0
8 (A)	Rehabilitation of overburden & spoils	ha	Waste Rock Dumps near TSF 1	11.5		1	1	R 1 332 227
		ha	Eastern WRD	78.0	R 115 845.83	1	1	R 9 035 974
		ha	Central WRD	70.0		1	1	R 8 109 207
		ha	North East WRD	95.0	R 115 845.83	1	1	R 11 005 353
		ha ha	Western WRD ROM Stockpile Pad	<u>58.0</u> 19.0		1	1	R 6 719 057 R 2 201 070
8 (B)	Rehabilitation of processing waste	ha	TSF 1	70.7	R 144 283.88	1	1	R 10 200 870
	deposits & evaporation ponds (basic,	ha	TSF 2	130.0	R 144 283.88	1	1	R 18 756 904
	salt producing waste)	ha	Dirty Water Dams	7.1	R 144 283.88	1	1	R 1 024 415
8 (C)	Rehabilitation of processing waste	ha	N/A	0	R 419 068.79	0.80	1	R 0
	deposits & evaporation ponds (acidic, metal-rich waste)							
9	Rehabilitation of subsided areas	ha	N/A	0	R 97 003.43	1	1	R 0
10	General surface rehabilitation	ha	100 ktpm Plant	7.0	R 91 769.43	1	1	R 642 386
		ha	PGM Stockpile (at 100 ktpm plant)	7.3	R 91 769.43	1	1	R 669 916
		ha	Old IMEC area	7.9		1	1	R 724 978
		ha	Top Soil Stockpiles	37.3	R 91 769.43	1	1	R 3 422 999
		ha	Norite Borrow Area	1.8	R 91 769.43 R 91 769.43	1	1	R 165 184
		ha ha	Haul Roads 300 ktpm Plant	22.4 19.4		1	1	R 2 055 635 R 1 780 327
		ha	Mobile Office Establishment	0.3		1	1	R 27 530
		ha	Laydown Area	1.5		1	1	R 137 654
		ha	Fleet Parking Area	13.3	R 419 068.79	1	1	R 5 573 614
		ha	East Pit (Backfilled area)	32.9	R 91 769.43	1	1	R 3 019 214
		ha	West Pit (Backfilled area)	0.0	R 91 769.43	1	1	RO
11	River diversions (to be decommissioned)	ha	N/A	0	R 91 769.43	1	1	R 0
12	Fencing Water management	m	N/A In-pit evaporation dams (10% of total	0	R 104.68 R 34 893.32	0.67	1	R 0
13	Water management	ha	In-pit evaporation dams (10% of total pit area)	16.2	r. 34 893.32	0.67	1	R 379 667
14	2 to 3 years of maintenance & offersore	he	All Areas	864.5	R 12 212.66	4	1	R 10 557 846
	2 to 3 years of maintenance & aftercare	ha		004.5		1	1	
15 (A)	Specialist study (Water pollution potential study)	Sum	All Areas	1	R 580 987.43	1	1	R 580 987
15 (B)	Specialist study (Overall quantified risk	Sum	All Areas	1	R 348 592.46	1	1	R 348 592
	assessment)							
15 (C)	Concrete Slabs & Light Structures	m <sup>2</sup>	TSF Infrastructure	3 134	R 154.13	1	1	R 483 028
		m²	300 ktpm Plant	40 199	R 154.13	1	Subtatal 4	R 6 195 685 R 140 098 145
						(Sum of items	Subtotal 1 1 to 15 Above)	140 098 145
16	Multiply Subtotal 1 by Weighting Factor		5	.0% of Subtot	al 1			R 7 004 907
	2 (step 4.4)						Subtotal 2	R 147 103 052
					(Subto	tal 1 plus Weighting I		r. 147 103 052
					10000			
17	Preliminary and general (P&G)		12	2.0 % of Subto	tal 2			R 17 652 366
						(Pub	Subtotal 3	R 164 755 419
						(Subtotal 2 plus F	aG item only)	
23	Contingency		10	0.0% of Subto	tal 2		Т	R 14 710 305
							Subtotal 4	R 179 465 724
						(Subtotal 3 plus	s contingency)	
24	VAT		4	1 0% of Sub-	tal A			D 25 425 204
	N/51		14	4.0% of Subto	lai 4			R 25 125 20

			CALCULATION OF THE QUA	NTUM				
line:	Tharisa Mine							
valuators:	SLR Consulting (Pty) Ltd				Date:	Year 6 (Jan 202 <sup>-</sup>	1)	
isk Class:	High (Class A)				Escalation (	CPI): <b>74.5%</b>		
rea Sensitivity:	Medium (for Biophysical, Social	and Ec	onomic Criteria)	Terrai	n (Weighting	factor 1): 1.00	(Flat)	
				Provimit	v (Weighting	factor 2): 1.05	(Peri-Urban)	
				TTOATTIN	y (weighting	1actor 2). <b>1.03</b>		
				Α	в	С	D	E=A*B*C*D
No.	Description:	Unit:	Operational Area	Quantity	Master rate	Multiplication	Weighting	Amount
						factor	factor 1	(Rands)
1	Dismantling of processing plant &	3	100 ktpm Plant	Step 4.5 76558	Step 4.3 R 11.90	Step 4.3	Step 4.4	R 910 934
1	related structures (incl. overland	m <sup>3</sup>					'	
	conveyors & power lines)	m <sup>3</sup>	300 ktpm Plant	191393	R 11.90	1	1	R 2 277 313
		m <sup>3</sup>	Chrome Plant	750	R 11.90	1	1	R 8 923
2 (A)	Demolition of steel buildings &	m <sup>2</sup>	Fleet Parking Area	6658	R 165.74	1	1	R 1 103 518
2 (0)	structures	m <sup>2</sup>	100 ktpm Plant	4174	R 165.74	1	1	R 691 812
		m <sup>2</sup>	300 ktpm Plant	10435	R 165.74	1	1	R 1 729 531
2 (B)	Demolition of reinforced concrete	m <sup>2</sup>	100 ktpm Plant	6034	R 244.25	1	1	R 1 473 824
	buildings & structures	m <sup>2</sup>	300 ktpm Plant	15084	R 244.25	1	1	R 3 684 316
		m <sup>2</sup>	Chrome Plant	100	R 244.25	1	1	R 24 425
3	Rehabilitation of access roads	m <sup>2</sup>	Access and Haul Roads	223375	R 29.66	1	1	R 6 625 151
4 (A)	Demolition & rehabilitation of electrified	m	N/A	0	R 287.87	1	1	RC
	railway lines				D /		<u> </u>	
4 (B)	Demolition & rehabilitation of non electrified railway lines	m	N/A	0	R 157.02	1	1	RC
5	Demolition of housing &/or	m <sup>2</sup>	300 ktpm Plant	6549	R 331.49	1	1	R 2 170 905
č	administration facilities			00-10		,	'	
6	Opencast rehabilitation including final	ha	East Pit	88.6	R 168 709.21	0.52	1	R 7 772 770
	voids & ramps	ha	West Pit	62.3	R 168 709.21	0.52	1	R 5 465 503
7	Sealing of shafts, adits & inclines	m <sup>3</sup>	N/A	0	R 88.98	1	1	R
8 (A)	Rehabilitation of overburden & spoils	ha	Waste Rock Dumps near TSF 1	11.5	R 115 845.83	1	1	R 1 332 227
		ha	Eastern WRD	78.0	R 115 845.83	1	1	R 9 035 974
		ha	Central WRD	70.0	R 115 845.83	1	1	R 8 109 207
		ha	North East WRD	95.0		1	1	R 11 005 353
		ha	Western WRD	58.0		1	1	R 6 719 057
9 (P)	Dehebilitation of processing wasts	ha	ROM Stockpile Pad	19.0 70.7	R 115 845.83 R 144 283.88	1	1	R 2 201 070 R 10 200 870
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic,	ha ha	TSF 1 TSF 2	130.0		1	1	R 18 756 904
	salt producing waste)	ha	Dirty Water Dams	7.1	R 144 283.88	1	1	R 1 024 415
8 (C)	Rehabilitation of processing waste	ha	N/A	0	R 419 068.79	0.80	1	R 024 415
- (-)	deposits & evaporation ponds (acidic,							
	metal-rich waste)							
9	Rehabilitation of subsided areas	ha	N/A	0		1	1	RC
10	General surface rehabilitation	ha	100 ktpm Plant	7.0		1	1	R 642 386
		ha	PGM Stockpile (at 100 ktpm plant)	7.3	R 91 769.43	1	1	R 669 916
		ha	Old IMEC area Top Soil Stockpiles	7.9	R 91 769.43 R 91 769.43	1	1	R 724 978 R 3 422 999
		ha ha	Norite Borrow Area	1.8	R 91 769.43 R 91 769.43	1	1	R 165 184
		ha	Haul Roads	22.4	R 91 769.43	1	1	R 2 055 635
		ha	300 ktpm Plant	19.4		1	1	R 1 780 327
		ha	Mobile Office Establishment	0.3	R 91 769.43	1	1	R 27 530
		ha	Laydown Area	1.5	R 91 769.43	1	1	R 137 654
		ha	Fleet Parking Area	13.3	R 419 068.79	1	1	R 5 573 614
		ha	East Pit (Backfilled area)	58.1	R 91 769.43	1	1	R 5 331 804
		ha	West Pit (Backfilled area)	0.0		1	1	R
11	River diversions (to be decommissioned)	ha	N/A	0		1	1	R
12	Fencing	m	N/A	0	R 104.68	1	1	R
13	Water management	ha	In-pit evaporation dams (10% of total	15.1	R 34 893.32	0.67	1	R 352 781
			pit area)					
14	2 to 3 years of maintenance & aftercare	ha	All Areas	878.2	R 12 212.66	1	1	R 10 725 160
15 (A)	Specialist study (Water pollution	Sum	All Areas	1	R 580 987.43	1	1	R 580 987
4E (D)	potential study)	C			D 249 500 10			D 040 50
15 (B)	Specialist study (Overall quantified risk assessment)	Sum	All Areas	1	R 348 592.46	1	1	R 348 592
15 (C)	Concrete Slabs & Light Structures	m²	TSF Infrastructure	3 134	R 154.13	1	1	R 483 028
- (-)		m <sup>2</sup>	300 ktpm Plant	40 199	R 154.13	1	1	R 6 195 685
	•						Subtotal 1	R 141 542 282
						(Sum of items		
16	Multiply Subtotal 1 by Weighting Factor 2 (step 4.4)		5	.0% of Subtot	al 1			R 7 077 114
	2 (Step 4.4)	1					Subtotal 2	R 148 619 396
					(Subto	tal 1 plus Weighting I		
17	Preliminary and general (P&G)		12	2.0 % of Subto	otal 2			R 17 834 327
						(Out+4-1-0-1	Subtotal 3	R 166 453 724
						(Subtotal 2 plus F	ag item only)	
23	Contingency		11	0.0% of Subto	tal 2		1	R 14 861 939
	······································						Subtotal 4	R 181 315 663
						(Subtotal 3 plus		
24	VAT		1,	4.0% of Subto	tal 4	_		R 25 384 192
						G (Subtot	RAND TOTAL	R 206 699 85

			CALCULATION OF THE QUA	NTUM				
line:	Tharisa Mine							
valuators:	SLR Consulting (Pty) Ltd				Date:	Year 7 (Jan 2022	2)	
isk Class:	High (Class A)				Escalation (0	CPI): 74.5%		
rea Sensitivity:	Medium (for Biophysical, Social	and Ec	onomic Criteria)	Terrai	n (Weighting	factor 1): 1.00	(Flat)	
,			,				. ,	E=A*B*C*D Amount (Rands) R 910 934: R 2 277 313. R 8 923. R 1 103 518. R 691 812. R 1 729 531. R 1 729 531. R 1 473 824. R 3 684 316. R 24 425. R 6 625 151. R 0. R 0. R 0. R 2 170 905. R 7 597 313. R 5 044 405. R 9 035 974. R 9 035 974. R 9 035 974. R 1 1005 353. R 6 719 057. R 2 10 907. R 10 200 870.
				Proximit	y (weighting	factor 2): 1.05	(Peri-Urban)	
				Α	В	С	D	E=A*B*C*D
No.	Description:	Unit:	Operational Area	Quantity	Master rate	Multiplication	Weighting	Amount
				-		factor	factor 1	(Rands)
				Step 4.5	Step 4.3	Step 4.3	Step 4.4	
1	Dismantling of processing plant &	m <sup>3</sup>	100 ktpm Plant	76558	R 11.90	1	1	R 910 934.
	related structures (incl. overland conveyors & power lines)	m <sup>3</sup>	300 ktpm Plant	191393	R 11.90	1	1	R 2 277 313.
	conveyors & power lines)		Chrome Plant	750	R 11.90	1	1	D 0 022
		m <sup>3</sup>				I	1	
2 (A)	Demolition of steel buildings &	m <sup>2</sup>	Fleet Parking Area	6658	R 165.74	1	1	
	structures	m <sup>2</sup>	100 ktpm Plant	4174	R 165.74	1	1	
Q (D)		m <sup>2</sup>	300 ktpm Plant	10435	R 165.74	1	1	
2 (B)	Demolition of reinforced concrete	m <sup>2</sup>	100 ktpm Plant	6034	R 244.25	1	1	
	buildings & structures	m <sup>2</sup>	300 ktpm Plant	15084	R 244.25	1	1	
2	Debekilitetien of second mode	m <sup>2</sup>	Chrome Plant	100	R 244.25	1	1	
3 4 (A)	Rehabilitation of access roads Demolition & rehabilitation of electrified	m <sup>2</sup> m	Access and Haul Roads N/A	223375	R 29.66 R 287.87	1	1	
+ (A)	railway lines		1.073	0	N 201.01	1	'	K U
4 (B)	Demolition & rehabilitation of non	m	N/A	0	R 157.02	1	1	R 0
	electrified railway lines							
5	Demolition of housing &/or	m²	300 ktpm Plant	6549	R 331.49	1	1	R 2 170 905
^	administration facilities		Fact Dit		D 400 700 0			D 7 667 6
6	Opencast rehabilitation including final voids & ramps	ha	East Pit	86.6	R 168 709.21	0.52	1	
		ha	West Pit	57.5	R 168 709.21	0.52	1	
7	Sealing of shafts, adits & inclines	m <sup>3</sup>	N/A	0	R 88.98	1	1	
8 (A)	Rehabilitation of overburden & spoils	ha	Waste Rock Dumps near TSF 1	11.5	R 115 845.83	1	1	
		ha	Eastern WRD	78.0		1	1	
		ha ha	Central WRD North East WRD	70.0	R 115 845.83 R 115 845.83	1	1	
		ha	Western WRD	95.0 58.0		1	1	
		ha	ROM Stockpile Pad	19.0		1	1	
8 (B)	Rehabilitation of processing waste	ha	TSF 1	70.7	R 144 283.88	1	1	
- (-)	deposits & evaporation ponds (basic,	ha	TSF 2	130.0		1	1	
	salt producing waste)	ha	Dirty Water Dams	7.1	R 144 283.88	1	1	
8 (C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	ha	N/A	0	R 419 068.79	0.80	1	R 0
9	Rehabilitation of subsided areas	ha	N/A	0	R 97 003.43	1	1	R 0
10	General surface rehabilitation	ha	100 ktpm Plant	7.0	R 91 769.43	1	1	R 642 386
		ha	PGM Stockpile (at 100 ktpm plant)	7.3	R 91 769.43	1	1	R 669 916
		ha	Old IMEC area	7.9	R 91 769.43	1	1	R 724 978
		ha	Top Soil Stockpiles	37.3	R 91 769.43	1	1	R 3 422 999
		ha	Norite Borrow Area	1.8	R 91 769.43	1	1	
		ha	Haul Roads	22.4	R 91 769.43	1	1	
		ha	300 ktpm Plant	19.4		1	1	
		ha	Mobile Office Establishment	0.3	R 91 769.43	1	1	
		ha	Laydown Area Fleet Parking Area	1.5 13.3	R 91 769.43 R 419 068.79	1	1	
		ha	0	67.9	R 91 769.43	1	1	
		ha ha	East Pit (Backfilled area) West Pit (Backfilled area)	67.9	R 91 769.43 R 91 769.43	1	1	
11	River diversions (to be decommissioned)	ha	N/A	0	R 91 769.43	1	1	
12	Fencing	m	N/A	0	R 104.68	1	1	
12	Water management	ha	In-pit evaporation dams (10% of total	14.4	R 34 893.32	0.67	1	
15		i idi	pit area)	14.4	11 07 080.02	0.07	'	1300 004
4.4	2 to 2 years of maintanas - 0 -4	hr		000 -	D 40 040 00	1	1	D 40 000 040
14	2 to 3 years of maintenance & aftercare	ha	All Areas	892.7	R 12 212.66	1	1	
15 (A)	Specialist study (Water pollution	Sum	All Areas	1	R 580 987.43	1	1	R 580 987
15 (B)	potential study) Specialist study (Overall quantified risk	Sum	All Areas	1	R 348 592.46	1	1	R 348 502
10 (D)	assessment)	Juli		1	11 0 10 0 32.40	'	'	13 040 092
15 (C)	Concrete Slabs & Light Structures	m <sup>2</sup>	TSF Infrastructure	3 134	R 154.13	1	1	R 483 028
	-	m <sup>2</sup>	300 ktpm Plant	40 199	R 154.13	1	1	R 6 195 685
			<b>_</b>				Subtotal 1	R 143 061 601
						(Sum of items	1 to 15 Above)	
40	Multiply Cubtots 4 by Mr. 191			00/ -10 11	ol 1			D 7 450 000
16	Multiply Subtotal 1 by Weighting Factor 2 (step 4.4)		5	.0% of Subtot	ail			R 7 153 080
	וב (סוטף דיד)						Subtotal 2	R 150 214 681
					(Subto	tal 1 plus Weighting F		
17	Preliminary and general (P&G)		12	2.0 % of Subto	otal 2			R 18 025 761
							Subtotal 3	R 168 240 443
						(Subtotal 2 plus P	&G item only)	
23	Contingency		41	0.0% of Subto	tal 2			R 15 021 468
20	leaningeney		1		Subtotal 4	R 183 261 911		
						(Subtotal 3 plus		
							<u> </u>	
24	VAT		1	4.0% of Subto	tal 4			R 25 656 667
						G	RAND TOTAL	R 208 918 579

			CALCULATION OF THE QUA	NTUM				
line:	Tharisa Mine							
aluators:	SLR Consulting (Pty) Ltd				Date:	Year 8 (Jan 2023	3)	
sk Class:	High (Class A)				Escalation (C	CPI): 74.5%		
ea Sensitivity:	Medium (for Biophysical, Social	and Ec	onomic Criteria)	Terrai	n (Weiahtina f	actor 1): 1.00	(Flat)	
	(1)					,	. ,	
				FIOXIMIL	y (weighting i	actor 2): 1.05	(Peri-Urban)	
				Α	В	с	D	E=A*B*C*D
No.	Description:	Unit:	Operational Area	Quantity	Master rate	Multiplication	Weighting	Amount
						factor	factor 1	(Rands)
		2		Step 4.5	Step 4.3	Step 4.3	Step 4.4	<b>D</b> 010 00
1	Dismantling of processing plant & related structures (incl. overland	m <sup>3</sup>	100 ktpm Plant	76558	R 11.90	1	1	R 910 934
	conveyors & power lines)	m <sup>3</sup>	300 ktpm Plant	191393	R 11.90	1	1	R 2 277 313
	,,	m <sup>3</sup>	Chrome Plant	750	R 11.90	1	1	R 8 923
0 (4)	Description of start buildings 9					1		
2 (A)	Demolition of steel buildings & structures	m <sup>2</sup>	Fleet Parking Area 100 ktpm Plant	6658 4174	R 165.74 R 165.74	1	1	R 1 103 518 R 691 812
	attucturea	m <sup>2</sup>	300 ktpm Plant	10435	R 165.74 R 165.74	1	1	R 1 729 531
2 (B)	Demolition of reinforced concrete	m <sup>2</sup>	100 ktpm Plant	6034	R 165.74 R 244.25	1	1	R 1 473 824
2 (D)	buildings & structures	m <sup>2</sup>	300 ktpm Plant	15084	R 244.25	1	1	R 3 684 316
		m <sup>2</sup>	Chrome Plant	1004	R 244.25	1	1	R 24 42
3	Rehabilitation of access roads	m <sup>-</sup>	Access and Haul Roads	223375	R 244.25 R 29.66	1	1	R 6 625 15
4 (A)	Demolition & rehabilitation of electrified	m- m	N/A	0	R 287.87	1	1	R 0 025 15
	railway lines			0				i i i i i i i i i i i i i i i i i i i
4 (B)	Demolition & rehabilitation of non	m	N/A	0	R 157.02	1	1	R
	electrified railway lines							
5	Demolition of housing &/or	m²	300 ktpm Plant	6549	R 331.49	1	1	R 2 170 90
6	administration facilities Opencast rehabilitation including final	ha	East Pit	84.5	R 168 709.21	0.52	1	R 7 413 08
0	voids & ramps		East Pit West Pit			0.52		R 7 413 08 R 4 614 53
-		ha		52.6	R 168 709.21		1	
7	Sealing of shafts, adits & inclines	m <sup>3</sup>	N/A	0	R 88.98	1	1	R
8 (A)	Rehabilitation of overburden & spoils	ha	Waste Rock Dumps near TSF 1	11.5	R 115 845.83		1	R 1 332 22
		ha	Eastern WRD Central WRD	78.0	R 115 845.83	1	1	R 9 035 97
		ha ha	North East WRD	70.0	R 115 845.83 R 115 845.83	1	1	R 8 109 20 R 11 005 35
		ha	Western WRD	58.0	R 115 845.83	1	1	R 6 719 05
		ha	ROM Stockpile Pad	19.0	R 115 845.83	1	1	R 2 201 07
8 (B)	Rehabilitation of processing waste	ha	TSF 1	70.7	R 144 283.88	1	1	R 10 200 87
	deposits & evaporation ponds (basic,	ha	TSF 2	130.0		1	1	R 18 756 90
	salt producing waste)	ha	Dirty Water Dams	7.1	R 144 283.88	1	1	R 1 024 41
8 (C)	Rehabilitation of processing waste	ha	N/A	0	R 419 068.79	0.80	1	R
	deposits & evaporation ponds (acidic,							
	metal-rich waste)				5 45 444 44			
9	Rehabilitation of subsided areas	ha	N/A	0	R 97 003.43	1	1	R
10	General surface rehabilitation	ha	100 ktpm Plant PGM Stockpile (at 100 ktpm plant)	7.0	R 91 769.43	1	1	R 642 38
		ha ha	Old IMEC area	7.3	R 91 769.43 R 91 769.43	1	1	R 669 91 R 724 97
		ha	Top Soil Stockpiles	37.3	R 91 769.43 R 91 769.43	1	1	R 3 422 99
		ha	Norite Borrow Area	1.8	R 91 769.43	1	1	R 165 18
		ha	Haul Roads	22.4	R 91 769.43	1	1	R 2 055 63
		ha	300 ktpm Plant	19.4	<b>D</b> 0 ( <b>D</b> 0 ( 0	1	1	R 1 780 32
		ha	Mobile Office Establishment	0.3	R 91 769.43	1	1	R 27 53
		ha	Laydown Area	1.5	R 91 769.43	1	1	R 137 65
		ha	Fleet Parking Area	13.3	R 419 068.79	1	1	R 5 573 61
		ha	East Pit (Backfilled area)	77.6	R 91 769.43	1	1	R 7 121 30
		ha	West Pit (Backfilled area)	22.9		1	1	R 2 101 52
11	River diversions (to be decommissioned)	ha	N/A	0	R 91 769.43	1	1	R
12	Fencing	m	N/A	0	R 104.68	1	1	R
13	Water management	ha	In-pit evaporation dams (10% of total	13.7	R 34 893.32	0.67	1	R 320 51
			pit area)					
14	2 to 3 years of maintenance & aftercare	ha	All Areas	906.8	R 12 212.66	1	1	R 11 074 44
15 (A)	Specialist study (Water pollution	Sum	All Areas	1	R 580 987.43	1	1	R 580 98
	potential study)							
15 (B)	Specialist study (Overall quantified risk	Sum	All Areas	1	R 348 592.46	1	1	R 348 59
45 (0)	assessment)	2	TOE Infrastru 1	A 14 1	D 451 1			B 100
15 (C)	Concrete Slabs & Light Structures	m <sup>2</sup>	TSF Infrastructure	3 134	R 154.13	1	1	R 483 02
	1	m <sup>2</sup>	300 ktpm Plant	40 199	R 154.13	1	Subtotal 1	R 6 195 68 R 144 539 66
						(Sum of items		r 144 339 66
						Louin of items		
16	Multiply Subtotal 1 by Weighting Factor		5	.0% of Subtot	al 1			R 7 226 98
	2 (step 4.4)							
							Subtotal 2	R 151 766 65
					(Subtot	al 1 plus Weighting F	actor 2 value)	
17	Proliminany and general (DPO)			0.0% -+ 0	tol 2			D 40 044 00
17	Preliminary and general (P&G)	l	12	2.0 % of Subto	nal∠		Subtotal 3	R 18 211 99 R 169 978 65
						(Subtotal 2 plus P		12 103 310 00
						Leastotal 2 plus F		
23	Contingency		1(	0.0% of Subto	tal 2			R 15 176 66
							Subtotal 4	R 185 155 31
						(Subtotal 3 plus	s contingency)	
<u>.</u>				1.00/ / C :				D 05 001
24	VAT		14	4.0% of Subto	tai 4		RAND TOTAL	R 25 921 74
						G		R 211 077 0

			CALCULATION OF THE QUA	NTUM				
line:	Tharisa Mine							
valuators:	SLR Consulting (Pty) Ltd				Date:	Year 9 (Jan 2024	4)	
	• ••						-,	
sk Class:	High (Class A)				Escalation (	CPI): 74.5%		
rea Sensitivity:	Medium (for Biophysical, Social	and Ec	onomic Criteria)	Torrai	n (Weighting)	factor 1): <b>1.00</b>	(Flat)	
ica ocrisitivity.	Medium (IOF Biophysical, Social		contonne enterna)				. ,	
				Proximit	y (Weighting	factor 2): 1.05	(Peri-Urban)	
				Α	В	С	D	E=A*B*C*D
No.	Description:	Unit:	Operational Area	Quantity	Master rate	Multiplication	Weighting	Amount
						factor	factor 1	(Rands)
				Step 4.5	Step 4.3	Step 4.3	Step 4.4	
1	Dismantling of processing plant &	m <sup>3</sup>	100 ktpm Plant	76558	R 11.90	1	1	R 910 934
	related structures (incl. overland conveyors & power lines)	m <sup>3</sup>	300 ktpm Plant	191393	R 11.90	1	1	R 2 277 313
	conveyors & power lines)	m <sup>3</sup>	Chrome Plant	750	R 11.90	1	1	R 8 923
							· ·	
2 (A)	Demolition of steel buildings &	m <sup>2</sup>	Fleet Parking Area	6658	R 165.74	1	1	R 1 103 518
	structures	m <sup>2</sup>	100 ktpm Plant	4174	R 165.74	1	1	R 691 812
		m <sup>2</sup>	300 ktpm Plant	10435	R 165.74	1		R 1 729 531
2 (B)	Demolition of reinforced concrete	m <sup>2</sup>	100 ktpm Plant	6034	R 244.25	1	1	R 1 473 824
	buildings & structures	m <sup>2</sup>	300 ktpm Plant	15084	R 244.25	1	1	R 3 684 316
		m <sup>2</sup>	Chrome Plant	100	R 244.25	1		R 24 425
3	Rehabilitation of access roads	m <sup>2</sup>	Access and Haul Roads	223375	R 29.66	1	1	R 6 625 15
4 (A)	Demolition & rehabilitation of electrified railway lines	m	N/A	0	R 287.87	1	1	R
4 (B)	Demolition & rehabilitation of non	m	N/A	0	R 157.02	1	1	R
. /	electrified railway lines		<u> </u>			·		
5	Demolition of housing &/or	m <sup>2</sup>	300 ktpm Plant	6549	R 331.49	1	1	R 2 170 90
	administration facilities							
6	Opencast rehabilitation including final	ha	East Pit	83.8	R 168 709.21	0.52	1	R 7 351 672
	voids & ramps	ha	West Pit	57.1	R 168 709.21	0.52	1	R 5 009 31
7	Sealing of shafts, adits & inclines	m <sup>3</sup>	N/A	0	R 88.98	1	1	R
8 (A)	Rehabilitation of overburden & spoils	ha	Waste Rock Dumps near TSF 1	11.5	R 115 845.83	1	1	R 1 332 22
		ha	Eastern WRD	78.0	R 115 845.83	1	1	R 9 035 97
		ha	Central WRD	70.0	R 115 845.83	1	1	R 8 109 20
		ha	North East WRD	95.0	R 115 845.83	1	1	R 11 005 35
		ha	Western WRD	58.0	R 115 845.83	1	1	R 6 719 05
0 (D)	Debekilitetien of engeneration words	ha	ROM Stockpile Pad	19.0	R 115 845.83	1	1	R 2 201 07
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic,	ha	TSF 1	70.7	R 144 283.88	1	1	R 10 200 87
	salt producing waste)	ha	TSF 2	130.0	R 144 283.88 R 144 283.88	1	1	R 18 756 90 R 1 024 41
8 (C)	Rehabilitation of processing waste	ha ha	Dirty Water Dams N/A	7.1	R 144 283.88 R 419 068.79	0.80	1	R 1 024 41
8 (C)	deposits & evaporation ponds (acidic,	na	IVA	0	K 419 000.79	0.80	'	K
	metal-rich waste)							
9	Rehabilitation of subsided areas	ha	N/A	0	R 97 003.43	1	1	R
10	General surface rehabilitation	ha	100 ktpm Plant	7.0	R 91 769.43	1	1	R 642 38
		ha	PGM Stockpile (at 100 ktpm plant)	7.3	R 91 769.43	1	1	R 669 91
		ha	Old IMEC area	7.9	R 91 769.43	1	1	R 724 97
		ha	Top Soil Stockpiles	37.3	R 91 769.43	1	1	R 3 422 99
		ha	Norite Borrow Area	1.8	R 91 769.43	1	1	R 165 18
		ha	Haul Roads	22.4	R 91 769.43	1	1	R 2 055 63
		ha	300 ktpm Plant	19.4		1		R 1 780 32
		ha	Mobile Office Establishment	0.3		1		R 27 53
		ha	Laydown Area	1.5	R 91 769.43	1	1	R 137 65
		ha	Fleet Parking Area	13.3	R 419 068.79	1	1	R 5 573 61
		ha	East Pit (Backfilled area)	83.8	R 91 769.43	1	1	R 7 690 27
**	Diver diversions (to be done in the initial	ha	West Pit (Backfilled area)	28.4	R 91 769.43	1		R 2 606 25
11	River diversions (to be decommissioned)	ha	N/A	0		1	1	R
12	Fencing	m	N/A	0	R 104.68	1	1	R
13	Water management	ha	In-pit evaporation dams (10% of total	14.1	R 34 893.32	0.67		R 329 40
			pit area)					
14	2 to 3 years of maintenance & aftercare	ha	All Areas	922.3	R 12 212.66	1	1	R 11 263 73
15 (A)	Specialist study (Water pollution	Sum	All Areas	1	R 580 987.43	1	1	R 580 98
1.5 (5)	potential study)	<u> </u>			D o (o - C - C			
15 (B)	Specialist study (Overall quantified risk	Sum	All Areas	1	R 348 592.46	1		R 348 59
15 (C)	assessment) Concrete Slabs & Light Structures	m <sup>2</sup>	TSF Infrastructure	3 134	R 154.13	1	1	R 483 02
13 (0)	Sonorete Glaus & Light Structures	m <sup>2</sup>	300 ktpm Plant	40 199	R 154.13 R 154.13	1		R 483 02 R 6 195 68
	L	- 111	ropin - rollin	-0 100	11.104.13	1	Subtotal 1	R 146 144 92
						(Sum of items		
16	Multiply Subtotal 1 by Weighting Factor		5	.0% of Subtot	al 1			R 7 307 24
	2 (step 4.4)	1						D /
					(0.1		Subtotal 2	R 153 452 16
					(Subto	tal 1 plus Weighting I	-actor 2 value)	
17	Preliminary and general (P&G)		4.5	2.0 % of Subto	ital 2			R 18 414 26
17	r reiminary and general (P&G)	1	12		nal Z		Subtotal 3	R 18 414 26 R 171 866 42
						(Subtotal 2 plus F		
						(		
23	Contingency		1	0.0% of Subto	tal 2			R 15 345 21
-							Subtotal 4	R 187 211 64
						(Subtotal 3 plus	s contingency)	
		_						
24	VAT		14	4.0% of Subto	tal 4			R 26 209 63
27							RAND TOTAL	R 213 421 27

			CALCULATION OF THE QUA	NTUM				
ne:	Tharisa Mine							
aluators:	SLR Consulting (Pty) Ltd				Date:	Year 10 (Jan 202	25)	
sk Class:	High (Class A)				Escalation (C	CPI): 74.5%		
ea Sensitivity:	Medium (for Biophysical, Social	and Ec	onomic Criteria)	Terrai	n (Weiahtina f	actor 1): 1.00	(Flat)	
	(1)					,	. ,	
				FIUXIMI	y (weighting i	actor 2): 1.05	(Peri-Urban)	
				Α	в	с	D	E=A*B*C*D
No.	Description:	Unit:	Operational Area	Quantity	Master rate	Multiplication	Weighting	Amount
						factor	factor 1	(Rands)
		2	100 ktpm Plant	Step 4.5	Step 4.3	Step 4.3	Step 4.4	<b>D</b> 010 00
1	Dismantling of processing plant & related structures (incl. overland	m <sup>3</sup>	100 ktpm Plant	76558	R 11.90	1	1	R 910 934
	conveyors & power lines)	m <sup>3</sup>	300 ktpm Plant	191393	R 11.90	1	1	R 2 277 313
	,,	m <sup>3</sup>	Chrome Plant	750	R 11.90	1	1	R 8 923
2 (4)	Demolition of steel buildings 9		Elect Darking Area	CCER	D 165 74	1	1	D 1 102 51
2 (A)	Demolition of steel buildings & structures	m <sup>2</sup>	Fleet Parking Area 100 ktpm Plant	6658 4174	R 165.74 R 165.74	1	1	R 1 103 518 R 691 812
	attucturea	m <sup>2</sup>	300 ktpm Plant	10435	R 165.74 R 165.74	1	1	R 1 729 531
2 (B)	Demolition of reinforced concrete	m <sup>2</sup>	100 ktpm Plant	6034	R 165.74 R 244.25	1	1	R 1 473 824
2 (B)	buildings & structures	m <sup>2</sup>	300 ktpm Plant	15084	R 244.25	1	1	R 3 684 316
	ballallige a chaotaroo	m <sup>2</sup> m <sup>2</sup>	Chrome Plant	1004	R 244.25	1	1	R 24 425
3	Rehabilitation of access roads	m <sup>2</sup>	Access and Haul Roads	223375	R 29.66	1	1	R 6 625 15
4 (A)	Demolition & rehabilitation of electrified	m- m	N/A	0	R 287.87	1	1	R 0 025 15
¥ 7	railway lines			0				
4 (B)	Demolition & rehabilitation of non	m	N/A	0	R 157.02	1	1	R
	electrified railway lines							
5	Demolition of housing &/or	m²	300 ktpm Plant	6549	R 331.49	1	1	R 2 170 90
6	administration facilities Opencast rehabilitation including final	ha	East Pit	83.1	R 168 709.21	0.52	1	R 7 290 26
6	voids & ramps		East Pit West Pit					
		ha		61.6	R 168 709.21	0.52	1	R 5 404 09
7	Sealing of shafts, adits & inclines	m <sup>3</sup>		0	R 88.98	1	1	R (
8 (A)	Rehabilitation of overburden & spoils	ha	Waste Rock Dumps near TSF 1	11.5	R 115 845.83	1	1	R 1 332 22
		ha	Eastern WRD	78.0	R 115 845.83	1	1	R 9 035 97
		ha ha	Central WRD North East WRD	70.0	R 115 845.83 R 115 845.83	1	1	R 8 109 20 R 11 005 35
		ha	Western WRD	58.0	R 115 845.83	1	1	R 6 719 05
		ha	ROM Stockpile Pad	19.0	R 115 845.83	1	1	R 2 201 07
8 (B)	Rehabilitation of processing waste	ha	TSF 1	70.7	R 144 283.88	1	1	R 10 200 87
- (-)	deposits & evaporation ponds (basic,	ha	TSF 2	130.0	R 144 283.88	1	1	R 18 756 90
	salt producing waste)	ha	Dirty Water Dams	7.1	R 144 283.88	1	1	R 1 024 41
8 (C)	Rehabilitation of processing waste	ha	N/A	0	R 419 068.79	0.80	1	R
	deposits & evaporation ponds (acidic,							
	metal-rich waste)				<b>D aT aaa a</b>			
9	Rehabilitation of subsided areas	ha	N/A	0	R 97 003.43	1	1	R
10	General surface rehabilitation	ha	100 ktpm Plant PGM Stockpile (at 100 ktpm plant)	7.0	R 91 769.43	1	1	R 642 38
		ha ha	Old IMEC area	7.3	R 91 769.43 R 91 769.43	1	1	R 669 91 R 724 97
		ha	Top Soil Stockpiles	37.3	R 91 769.43	1	1	R 3 422 99
		ha	Norite Borrow Area	1.8	R 91 769.43	1	1	R 165 18
		ha	Haul Roads	22.4	R 91 769.43	1	1	R 2 055 63
		ha	300 ktpm Plant	19.4	R 91 769.43	1	1	R 1 780 32
		ha	Mobile Office Establishment	0.3	R 91 769.43	1	1	R 27 53
		ha	Laydown Area	1.5	R 91 769.43	1	1	R 137 65
		ha	Fleet Parking Area	13.3	R 419 068.79	1	1	R 5 573 61
		ha	East Pit (Backfilled area)	90.0	R 91 769.43	1	1	R 8 259 24
		ha	West Pit (Backfilled area)	33.9	R 91 769.43	1	1	R 3 110 98
11	River diversions (to be decommissioned)	ha	N/A	0	R 91 769.43	1	1	R
12	Fencing	m	N/A	0	R 104.68	1	1	R
13	Water management	ha	In-pit evaporation dams (10% of total	14.5	R 34 893.32	0.67	1	R 338 28
			pit area)					
14	2 to 3 years of maintenance & aftercare	ha	All Areas	937.8	R 12 212.66	1	1	R 11 453 03
15 (A)	Specialist study (Water pollution	Sum	All Areas	1	R 580 987.43	1	1	R 580 98
	potential study)							
15 (B)	Specialist study (Overall quantified risk	Sum	All Areas	1	R 348 592.46	1	1	R 348 59
45 (0)	assessment)	2	TOE Infrastru 1		D 151 12			B 100
15 (C)	Concrete Slabs & Light Structures	m <sup>2</sup>	TSF Infrastructure	3 134	R 154.13	1	1	R 483 02
	1	m²	300 ktpm Plant	40 199	R 154.13	1	Subtotal 1	R 6 195 68 R 147 750 17
						(Sum of items		r 147 / 50 17
						Louin of items		
16	Multiply Subtotal 1 by Weighting Factor		5	.0% of Subtot	al 1			R 7 387 50
	2 (step 4.4)							
							Subtotal 2	R 155 137 68
					(Subtot	al 1 plus Weighting F	actor 2 value)	
17	Proliminany and general (DPO)			0.0% ~ 0	tal 2			D 40 040 50
17	Preliminary and general (P&G)		12	2.0 % of Subto	ιαi∠		Subtotal 3	R 18 616 52 R 173 754 20
Subtrait 2 plus P& (item (Subtotal 2 plus P& (item							13 173 734 20	
						Leastotal 2 plus F		
23	Contingency		1(	0.0% of Subto	tal 2			R 15 513 76
							Subtotal 4	R 189 267 97
		(Subtotal 3 plus contingency)						
24	VAT			4.0% of Subto	-1.4		1	R 26 497 51

			CALCULATION OF THE QUA	NTUM				
line:	Tharisa Mine							
valuators:	SLR Consulting (Pty) Ltd				Date:	LOM (Mar 2034)		
lisk Class:	High (Class A)				Escalation (0	,		
rea Sensitivity:	Medium (for Biophysical, Social	and Ec	onomic Criteria)	Terrai	n (Weighting	factor 1): 1.00	(Flat)	
				Proximit	y (Weighting	actor 2): 1.05	(Peri-Urban)	
				Α	В	с	D	E=A*B*C*D
No.	Description:	Unit:	Operational Area	Quantity	Master rate	Multiplication	Weighting	Amount
						factor	factor 1	(Rands)
		3		Step 4.5	Step 4.3	Step 4.3	Step 4.4	D 010 001
1	Dismantling of processing plant & related structures (incl. overland	m <sup>3</sup>	100 ktpm Plant	76558	R 11.90	1	1	R 910 934.
	conveyors & power lines)	m³	300 ktpm Plant	191393	R 11.90	1	1	R 2 277 313.
		m <sup>3</sup>	Chrome Plant	750	R 11.90	1	1	R 8 923.
2 (A)	Demolition of steel buildings &	m <sup>2</sup>	Fleet Parking Area	6658	R 165.74	1	1	R 1 103 518.
	structures	m²	100 ktpm Plant	4174	R 165.74	1	1	R 691 812.
		m <sup>2</sup>	300 ktpm Plant	10435	R 165.74	1	1	R 1 729 531.
2 (B)	Demolition of reinforced concrete	m <sup>2</sup>	100 ktpm Plant	6034	R 244.25	1	1	R 1 473 824.
	buildings & structures	m <sup>2</sup>	300 ktpm Plant	15084	R 244.25	1	1	R 3 684 316.
3	Rehabilitation of access roads	m <sup>2</sup> m <sup>2</sup>	Chrome Plant Access and Haul Roads	100 223375	R 244.25 R 29.66	1	1	R 24 425. R 6 625 151.
4 (A)	Demolition & rehabilitation of electrified	m⁻ m	N/A	0	R 287.87	1	1	R 0.
	railway lines							
4 (B)	Demolition & rehabilitation of non	m	N/A	0	R 157.02	1	1	R 0.
5	electrified railway lines Demolition of housing &/or	m²	300 ktpm Plant	6549	R 331.49	1	1	R 2 170 905.
	administration facilities			0048	11 001.48		'	
6	Opencast rehabilitation including final	ha	East Pit	76.8	R 168 709.21	0.52	1	R 6 737 570.
	voids & ramps	ha	West Pit	39.4	R 168 709.21	0.52	1	R 3 456 514.
7	Sealing of shafts, adits & inclines	m <sup>3</sup>	N/A	0	R 88.98	1	1	R 0.
8 (A)	Rehabilitation of overburden & spoils	ha	Waste Rock Dumps near TSF 1	11.5	R 115 845.83	1	1	R 1 332 227
		ha	Eastern WRD	78.0	R 115 845.83	1	1	R 9 035 974
		ha ha	Central WRD North East WRD	70.0	R 115 845.83 R 115 845.83	1	11	R 8 109 207 R 11 005 353
		ha	Western WRD	58.0	R 115 845.83	1	1	R 6 719 057
		ha	ROM Stockpile Pad	19.0	R 115 845.83	1	1	R 2 201 070
8 (B)	Rehabilitation of processing waste	ha	TSF 1	70.7	R 144 283.88	1	1	R 10 200 870
	deposits & evaporation ponds (basic,	ha	TSF 2	130.0	R 144 283.88	1	1	R 18 756 904
8 (C)	salt producing waste) Rehabilitation of processing waste	ha ha	Dirty Water Dams N/A	7.1	R 144 283.88 R 419 068.79	1 0.80	1	R 1 024 415. R 0.
8 (C)	deposits & evaporation ponds (acidic,	па	IVA	0	K 419 000.79	0.00	'	K 0.
	metal-rich waste)							
9	Rehabilitation of subsided areas	ha	N/A	0	R 97 003.43	1	1	R 0.
10	General surface rehabilitation	ha	100 ktpm Plant	7.0	R 91 769.43	1	1	R 642 386.
		ha	PGM Stockpile (at 100 ktpm plant) Old IMEC area	7.3	R 91 769.43	1	1	R 669 916
		ha	Top Soil Stockpiles	7.9	R 91 769.43 R 91 769.43	1	1	R 724 978. R 3 422 999
		ha ha	Norite Borrow Area	1.8	R 91 769.43	1	1	R 165 184
		ha	Haul Roads	22.4	R 91 769.43	1	1	R 2 055 635
		ha	300 ktpm Plant	19.4	R 91 769.43	1	1	R 1 780 327
		ha	Mobile Office Establishment	0.3	R 91 769.43	1	1	R 27 530
		ha	Laydown Area	1.5	R 91 769.43	1	1	R 137 654.
		ha	Fleet Parking Area	13.3	R 419 068.79	1	1	R 5 573 614
		ha	East Pit (Backfilled area) West Pit (Backfilled area)	173.1	R 91 769.43 R 91 769.43	1	1	R 15 885 289 R 6 185 259
11	River diversions (to be decommissioned)	ha ha	N/A	67.4	R 91 769.43 R 91 769.43	1	1	R 6 185 259 R 0
12	Fencing	m	N/A	0	R 104.68	1	1	R 0.
12	Water management	ha	In-pit evaporation dams (10% of total	11.6	R 34 893.32	0.67	1	R 271 658
			pit area)			0.07		
14	2 to 3 years of maintenance & aftercare	ha	All Areas	1 025.9	R 12 212.66	1	1	R 12 528 970.
15 (A)	Specialist study (Water pollution	Sum	All Areas	1	R 580 987.43	1	1	R 580 987.
	potential study)			· ·				
15 (B)	Specialist study (Overall quantified risk	Sum	All Areas	1	R 348 592.46	1	1	R 348 592.
15 (0)	assessment) Concrete Slabs & Light Structures	2		0.404	D 464 40			B 400 000
15 (C)	Concrete Stabs & Light Structures	m <sup>2</sup> m <sup>2</sup>	TSF Infrastructure 300 ktpm Plant	3 134 40 199	R 154.13 R 154.13	1	1	R 483 028 R 6 195 685
		- 111	mpro-rodin	-10100	11 104.13	1	Subtotal 1	R 156 959 525
						(Sum of items 1		
16	Multiply Subtotal 1 by Weighting Factor 2 (step 4.4)		5	.0% of Subtot	ai 1			R 7 847 976
	12 (arap 4.4)	1					Subtotal 2	R 164 807 501
					(Subto	al 1 plus Weighting F		
17	Preliminary and general (P&G)		12	2.0 % of Subto	tal 2		Culture 1 C	R 19 776 900
						(Subtotal 2 plus P	Subtotal 3 &G item only)	R 184 584 401
							so itom only/	
23	Contingency		1(	0.0% of Subto	tal 2			R 16 480 750
							Subtotal 4	R 201 065 151
						(Subtotal 3 plus	contingency)	
04	VAT		14	1.0% of Subto	tal 4			R 28 149 121
24								

**APPENDIX C: Details of DMR Closure Components** 

#### 1. INTRODUCTION

Generally accepted closure methods, based on experience in the field, have been used as the basis for determining the Master rates for the various closure components in the DMR "rules-based" approach.

The details enclosed in the approved EMP will however take precedence over these generally accepted closure methods.

#### 2. GENERALLY ACCEPTED CLOSURE METHODS USED TO DETERMINE THE DMR MASTER RATE

#### 2.1. COMPONENT 1: PROCESSING PLANT

The common method of valuation to determine the Master rate for processing plants is that:

- All infrastructure and concrete buildings should be broken down to natural ground 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 noted in the relevant EMP,
- The monitoring and maintenance of these areas has 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.

#### 2.2. COMPONENTS 2(A) AND 2 (B): STEEL AND REINFORCED CONCRETE BUILDINGS AND STRUCTURES

The common method of valuation to determine the Master rate for steel and reinforced concrete buildings and structures is that:

- 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,

#### 2.3. COMPONENT 3: ACCESS ROADS

(No details provided in DMR guideline)

#### 2.4. COMPONENT 4 (A) AND 4 (B): RAILWAYS

The valuation of the removal of railway lines is based on:-

- The removal of the ballast, sleepers and rail,
- All culverts, bridges and structures are to remain,
- No rehabilitation to the general earthworks, neither cut nor fill,
- Removal of the electrification of the railway lines, including sub-stations and signalling,
- General clean up and making certain of adequate drainage,
- No credit is allowed for second-hand rail and ballast.

#### 2.5. COMPONENT 5: HOUSING AND ADMINISTRATION FACILITIES

Same as for Component 2(A) and 2(B): Steel and Reinforced Concrete Buildings and Structures

#### 2.6. COMPONENT 6: OPENCAST REHABILITATION

Some form of beneficial land use is desirable after mining. Hence, in-filling of opencast pits is advocated in order to facilitate post-mining beneficial land use. In-filling normally constitutes the following modes of action:

- Concurrent in-filling and subsequent spoils rehabilitation as routinely conducted for opencast pits on collieries.
- In-filling by obtaining material from adjacent opencast pits and/or other parts of the same opencast pit as routinely conducted on iron ore mines.

Difficulties could be experienced with concurrent infilling in those cases where the ore body is limited to a single opencast pit and various grades of ore need to be sourced from the pit. This requires access to the full pit and in-filling could sterilise ore reserves. In these cases rehabilitation should be facilitated as follows:

- Excess material from the opencast pit is deposited in close proximity to the pit for in-filling of the opencast pit once the ore body has been removed.
- Excess material is deposited in such a manner in relation to the opencast pit that mine residue deposit rehabilitation can be conducted with respect to this material. In this case the opencast pit perimeter walls must still be rendered safe for humans and domestic animals. This is normally achieved by means of the following:
  - Sloping the perimeter walls of the opencast pit at 1:3 (18°) to the pit floor or to the stable groundwater level that could establish within a reasonable period within the opencast pit.
  - Providing enviro berms along the opencast pit perimeter when perimeter wall flattening is not feasible as in those cases where opencast mining has been conducted on steep mountain sides.

Notwithstanding the above, owing to removal of the mined product off-site, notably less material remains on site for pit in-filling than was originally removed from the opencast pit. This could be despite bulking of the removed material. Hence final voids with respect to most opencast pits would be unavoidable. These voids should be addressed in the same manner as making the opencast pit safe as described above.

#### 2.7. COMPONENT 7: SEALING OF SHAFTS, ADITS AND INCLINES

The sealing of vertical and incline shafts are primarily a safety consideration and this should be conducted in such a manner that potential safety risks are largely obviated.

Normally, inert building rubble arising from the demolition of surface infrastructure should be deposited into the shafts. A mass concrete cap of 1 000 mm thickness is placed onto the building rubble deposited into the shaft. It should be noted that, in specific circumstances, dedicated engineering design and specification of these caps could be required.

Allowance should also be made for methane venting of the underground mine workings with a methane formation potential by means of strategically placed venting boreholes.

# 2.8. COMPONENTS 8 (A), 8 (B) AND 8 (C): OVERBURDEN AND SPOILS, PROCESS PLANT WASTE: BASIC, SALT-PRODUCING AND PROCESS PLANT WASTE: ACIDIC, METAL-RICH.

#### 2.8.1. Component 8A: Overburden and spoils

Overburden and spoils normally have a low pollution potential and hence only need to be shaped to create a stable landform. The Master rate thus includes shaping and grassing/vegetation of the overburden and spoils.

#### 2.8.2. Component 8B: Process plant waste: basic, salt-producing

The Master rate for basic, salt-producing process plant waste includes shaping and grassing/ vegetation of the dumps as well as establishing an armoured cover on the reshaped surface of the dump.

#### 2.8.3. Component 8C: Process plant waste: acidic, metal-rich

The Generally accepted closure methods for acidic, metal-rich plant waste are primarily aimed at the following:

- Limiting seepage of contaminants from the processing waste deposit
- Prevention of contaminated seepage entering local surface and groundwater sources.

The Master rate includes allowances for slope modification, armouring and evaporative covers, lined pollution control dams and lined cut-off trenches.

## 2.8.4. Closure elements specific to 8 (A), 8 (B) or 8 (C)

Generally, average modified outer slopes of 1:3 (18°) are required. Although not specifically stated, benches at regular intervals are also required. This should ensure that the modified outer slopes between benches do not exceed 35 to 40 m in order to curb stormwater flow velocities on the outer slopes. Benches should be at least 5 m wide, sloping inwards at a slope of about 1:10.

Current generally accepted closure methods allows for a dedicated cover to be provided on the modified outer slopes of the residue deposit. The cover has to fulfil the following primary functions:

- Protection of the integrity/stability of the modified outer slope.
- Limiting the ingress of air and water into residue material that has the potential to contaminate local groundwater by means of contaminated seepage arising from the footprint area of the deposit.
- Separation of the deposited residue from uncontaminated surface runoff arising from the outer slopes of the residue deposit.
- Contribution to the aesthetic appeal of the rehabilitated residue deposit.

Covers fulfilling the above functions could be of varying nature, comprising of natural and/or synthetic material. If natural materials are to be used, current practice allows for an evaporative cover, varying in thickness between 750 and 1 000 mm, with an outer cover layer of 300 m thickness of armouring or topsoil with vegetation. The armouring also requires vegetation, but this is not essential for the long-term integrity of the outer cover layer. Depending on the nature of the deposited material covered, capillary breaker layers between the evaporative cover and the deposited material could also be required.

Current generally accepted closure methods indicates that operational pollution control dams are properly lined to prevent the migration of the contaminated water impounded in the dam to the shallow groundwater or the nearby receiving surface water environment. Mostly, synthetic (HDPE) liners are provided for this purpose. However, these liners have a finite life and eventual failure of these liners would result in the salts and other contaminants that accumulated in the pollution control dam(s) over the years to be dissipated into the receiving water environment. Hence, from a holistic view the provision of a pollution control dam served a limited function, only postponing the release of contaminants into the receiving water environment. However, contaminant release has been spread-out over a period of about 50 years, starting from mine residue deposit rehabilitation to final disintegration of the liner in the pollution control dam(s). This situation would most likely allow for an acceptable residual impact, with salt/contaminant release into the receiving water environment at a rate that does not exceed the "natural" assimilative capacity of the receiving water resource. The only exception could be extremely sensitive water resources.

Stormwater runoff arising from the upper and outer slopes of the rehabilitated residue deposit should be managed for the following primary reasons:

- Prevention of uncontrolled runoff from the residue deposit, thereby creating surface erosion and resultant damage to the cover and under extreme cases exposing the deposited material.
- Routing of the runoff arising from the rehabilitated residue deposit into the surrounding surface water drainage regime in a manner that would limit the creation of secondary erosion in the receiving surface water environment and/or possible damage to downstream surface infrastructure.
- Allowing for the control routing of the runoff collected on the rehabilitated residue deposit across cut-off, seepage or solution trenches provided to handle excess contaminated seepage from the residue deposit.

In addition to the above, upslope stormwater diversion measures could also be required to route upslope runoff past the residue deposit to prevent possible cover damage and other specific local drainage requirements. Toe paddocks could also be required along the outer perimeter toe of the rehabilitated residue deposit to capture sediment arising from the cover material whilst vegetation on the cover is still in the process of establishment.

Current practice allows for two broad approaches to handle runoff arising from the rehabilitated residue deposit. These are as follows:

- Collection of the runoff arising from the benches in chutes to route this water to the toe of the residue deposit. Chutes must be constructed from concrete or other suitable material to cater for the high flow velocities that could be encountered.
- Collection of runoff arising from the modified outer slopes on the benches itself and allowing this water to evaporate on the benches. Under these circumstances bench width could be wider than the normal 5 m width, with parapet walls provided on the outer edges of the benches. These walls must be designed for at least the 1:200 year rainfall events. The residue deposit material must also be suitable for this type of stormwater contaminant and must not be susceptible to slumping under saturated conditions.

In very sensitive environmental situations and/or where the seepage from the residue deposit could be highly contaminated, a cut-off drain around the perimeter of the residue deposit may be required. Abstraction of the seepage collected in the cut-of drain by means of pumps at predetermined spacing would be required. The collected seepage has to be routed to a pollution control dam for disposal.

#### 2.9. COMPONENT 9: SUBSIDED AREAS

(No details provided in DMR guideline, but presumed to be similar to Component 10: General Surface Rehabilitation)

#### 2.10. 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.

Irrespective of the final land use, general surface rehabilitation normally should ensure the following:

- Surface topography that emulates the surrounding areas and aligned to the general landscape character. Steep slopes in excess of 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.

The unit cost for general rehabilitation allows for shaping and landscaping of disturbed areas. The Master rate allows for the shaping of material to a depth/thickness of about 500 mm. An extra over allowance in the unit cost of 50 percent has been made to cover the removal and/or destruction of surface infrastructure remnants and/or other undesirable objects such as trees, foundations, concrete slabs, etc.

#### 2.11. COMPONENT 11: RIVER DIVERSIONS

Although not desirable, river diversions are unavoidable in some cases to allow mining, especially opencast mining, to proceed.

Wetland areas are normally associated with river diversions and during the operational period some form of riparian habitat could most likely have established within the stream diversion area. Hence considerations should be given whether a stream diversion should be changed at mine closure. This could require dedicated assessments to guide decision-making in this regard. Moreover, removal of stream diversions could result in stream flow over mined areas that could result in undesirable water quality effects.

In the event that river diversions should be removed at closure, the Master rate is the same as for general surface rehabilitation.

#### 2.12. COMPONENT 12: FENCING

(No details provided in DMR guideline)

#### 2.13. COMPONENT 13: WATER MANAGEMENT

Current practice is to provide in-pit evaporation dams for opencast pits. Ideally these dams should coincide with pit final voids. The dams should be sized that groundwater inflow into the pit plus rehabilitated spoils recharge can be evaporated from the dam. The dam perimeter as in the case of opencast pits must be shaped to render it safe. The same approach as for opencast pits is generally followed.

Underground mine workings has the potential to eventually fill up with water and decant. Depending on the decant mode and the type of product mined, this water could be of a poor quality. Hence provision should be made to collect and handle this water to limit degradation of water resources in the vicinity of potential decant. Collection and neutralisation (with associated metal removal) is an established management practice to deal with this water. However, the elevated salt content normally associated with this water is still a matter of concern. Hence, advanced treatment such as desalination of this water is currently considered and in some cases pilot pants have been established to assess feasibility. Treatment technologies not producing brine are currently favoured. However, this is not possible with all types of excess mine water.

It should be noted that the filling of a mine could involve a notable period of time and the required treatment capacity to handle the excess mine water could only be required decades after mine closure. Hence the future implementation of these plants most likely by third parties should also receive consideration.

Note: Costs associated with brine producing treatment technologies were also assessed. Although the capital costs associated with these technologies could be lower than for non-brine producing technologies, the operating and maintenance costs are notably higher. Hence the overall costs for water management and treatment in the guideline document are not notably different, based on the water treatment method, to warrant distinction.

#### 2.14. COMPONENT 14: MAINTENANCE AND AFTERCARE

Maintenance and aftercare is planned for 2 to 3 years after mine production ceases, and covers:

- Annually fertilising of rehabilitated areas,
- Monitoring of surface and subsurface water quality surface,
- Control of wattle and all other alien plants,
- General maintenance, including rehabilitation of cracks and subsidence.