Project Reference: 710.12015.00001 26 July 2013

Lehating Mine
Lehating Mining (Pty) Ltd

CALCULATION OF THE FINANCIAL CLOSURE LIABILITY FOR LEHATING MINE

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 Report for the proposed Lehating Manganese Mine.

The calculations of the financial closure liability associated with the 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 the Mine.

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	Manganese Mine – Underground
Saleable mineral by-product	Manganese Ore

2.2. STEP 2: RISK RANKING

According to the DMR guideline, Lehating Mine, due to its minerals mined (manganese), tonnages (greater than 10,000 tonnes per month) and the fact that the project comprises a mine, mine waste, a plant and plant waste, 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 [1] – High risk (Large mine, greater than 10,000 tonnes per month and comprising mine, mine waste, plant and plant waste
Revised risk ranking	N/A

2.3. STEP 3: ENVIRONMENTAL SENSITIVITY OF THE MINE AREA

Lehating Mine is classified as having a High environmental sensitivity based on the classification criteria below.

- A high biophysical sensitivity (based on the pre-mining environment of the project area).
- A low social sensitivity (based on the proximity of the project area to local communities).
- A low 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).

[1] Class A – High risk = A high probability of occurrence of an impact with a severe consequence.

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

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.

Extensive	Information available must include the following: • 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 [2]	Information available is less comprehensive than that given above

Since no detailed Closure Plan for the 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.

[2] 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 Lehating Mine are identified from the list below.

No.	Description of Closure Components [3]	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	No
7	Sealing of shafts, adits & inclines	Yes
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)	Yes
13	Water management	Yes
14	2 to 3 years of maintenance & aftercare	Yes
15(A)	Specialist study - Overall quantified risk assessment incl. water pollution potential study	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:

[3] The Closure Components selected are in-line with the project description and decommissioning and closure objectives detailed in Chapter 2 of the *ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR THE PROPOSED LEHATING MINE* (SLR Project 710.12015.00001, Report No. 1, July 2013), prepared for Lehating Mining (Pty) Ltd.

January to December								January to May
2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
3.4%	4.6%	7.2%	11.5%	7.1%	4.3%	5.0%	5.6%	2.4%

i.e. a total of 63.96% since January 2005 (i.e. 1.034 x 1.046 x 1.072 … etc.).

No.	Description	Unit	Master Rate (at May 2013)	Multiplication Factor [4]
1	Dismantling of process plant & related structures (incl. overland conveyors & power lines)	m^3	R 11.18	1.00
2 (A)	Demolition of steel buildings & structures	m^2	R 155.76	1.00
2 (B)	Demolition of reinforced concrete buildings & structures	m^2	R 229.54	1.00
3	Rehabilitation of access roads	m^2	R 27.87	1.00
4 (A)	Demolition & rehabilitation of electrified railway lines	M	R 270.53	1.00
4 (B)	Demolition & rehabilitation of non electrified railway lines	M	R 147.56	1.00
5	Demolition of housing &/or administration facilities	m^2	R 311.52	1.00
6	Opencast rehabilitation including final voids & ramps	Ha	R 163 304.16	1.00
7 [5]	Sealing of shafts, adits & inclines – concrete capping	m^3	R 5 246.85	1.00
	Sealing of shafts, adits & inclines – backfill of shaft	m^3	R 53.75	1.00
	Sealing of shafts, adits & inclines - geotechnical investigation, survey	Sum	R 125 238.00	1.00
8 (A)	Rehabilitation of overburden & spoils	Ha	R 108 869.44	1.00
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	Ha	R 135 594.92	1.00
8 (C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	Ha	R 393 831.92	1.00
9	Rehabilitation of subsided areas	Ha	R 91 161.76	1.00
10	General surface rehabilitation	Ha	R 86 242.96	1.00
11	River diversions	Ha	R 86 242.96	1.00
12	Fencing	m	R 98.38	1.00
13	Water management	Ha	R 32 792.00	1.00
14	2 to 3 years of maintenance & aftercare	Ha	R 11 477.20	1.00
15 (A)	Specialist study - Overall quantified risk assessment incl. water pollution potential study	Sum	R 500 000.00	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.

[4] Multiplication factor based on Risk Ranking = Class A and Environmental Sensitivity = High.

[5] Item 7 – Sealing of shafts, adits and inclines - has been split into three components as per Appendix C.3: Generally Accepted Closure Methods of the Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine, and the DMR rates of January 2005 inflated by CPI to account for escalation.

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

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 the proposed Lehating Mine is shown in Appendix A.

The proposed operations will consist of the following disturbed areas:

- Main and Vent Shafts
- Access Roads
- Waste Dumps (Tailings & Waste Rock)
- Crushing and Screening Plant
- Stockpile Areas
- Stores, Workshops and Offices
- Surface Water Management Facilities
- Water Supply and Treatment
- Other Support Infrastructure and Facilities

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

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)	• Screening level risk assessment
Class C (Low risk)	

3. STEP 4.7: CALCULATE THE CLOSURE LIABILITY

3.1. PROJECT RAMP UP

The anticipated construction ramp up at Lehating Mine is summarised in the table below.

Aspect	Timeframe
Vegetation clearing and earthworks	
Start construction	First quarter of 2014
Duration of construction	Approximately 6 months
Establishment of new access road	
Start construction	First quarter of 2014
Duration of construction	Approximately 6 months
Life of operation	For the life of mine
Construction of Waste Rock Dump	
Start construction	Third quarter of 2014
Duration of construction	Approximately 3 months
Life of operation	For the life of mine
Shaft Sinking	
Start construction	Third quarter of 2014
Duration of construction	Approximately 21 months
Life of operation	For the life of mine
Tailings Facility Construction	
Start construction	Fourth quarter of 2014
Duration of construction	Approximately 6 months
Life of operation	For the life of mine
Process Plant Construction	
Start construction	First quarter of 2016
Duration of construction	Approximately 9 months
Life of operation	For the life of mine
Construction of Water and Power Supply	
Start construction	First quarter of 2015
Duration of construction	Approximately 6 months
Life of operation	For the life of mine
Construction of Sewage Plant	
Start construction	First quarter of 2015
Duration of construction	Approximately 3 months
Life of operation	For the life of mine
Underground Drilling and Blasting	
Start construction	First quarter of 2017
Duration of construction	Approximately 15 months
Life of operation	For the life of mine

The project programme below is extrapolated from the above timeframes.

Activity	Yr1				Yr2				Yr3				Yr4				Yr5		Yr6	Yr7	Yr8	Yr9	Yr10	Yr11-24
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2-4						
Construction																								
Clear area of Vegetation and Stockpile Topsoil																								
Construct Roads																								
Construct Waste Rock Dump Area																								
Shaft Sinking																								
Construction of TSF Paddocks																								
Construction of Water and Power Supply and other Supportive Infrastructure																								
Construction of Plant and Processing Infrastructure																								
Construction of Underground Facilities																								
Operations																								
Stockpiling of Product and Fines																								
Deposition of Tailings																								

3.2. CALCULATION QUALIFICATIONS

The following qualifications are applicable to quantum calculations:

The following is to be noted regarding the mineralised waste facilities in terms of the annual closure calculations for Years 1 to 10:

- The TSF paddocks will be constructed of waste rock from shaft sinking. Thereafter the TSF paddocks will be filled in sequence during operations. Accordingly, empty TSF paddocks are considered as waste rock dump for the purpose of the quantum calculation.
- The Waste rock dump will accommodate waste rock remaining after TSF paddock construction. Prior to deposition of waste rock, the dump area will only qualify for general surface rehabilitation.
- Based on the above construction timeframes, production is expected to begin in the 2nd quarter of 2018.
- The TSF has a design capacity of 15 - 20 years, equal to the estimated life of mine. The same is assumed for the fines storage area.
- The Waste rock dump is expected to be mostly complete by the start of production with only small amount of waste rock being deposited during production when required. The footprint of the waste rock dump is assumed to reach its maximum area

The following is to be noted regarding product and fines in terms of the annual closure calculations for Years 1 to 10:

- Product stockpiles will only become operational during production, until then these areas will only qualify for general surface rehabilitation.
- Fines storage will only become operational during production. It is assumed that the fines storage area is designed for the 15 - 20 year life of mine.
- In terms of the applicable DMR closure components, the product stockpile areas fall under general surface rehabilitation, whilst any remaining fines stockpiles are to be treated as processing waste deposits.

In terms of general surface rehabilitation, the entire footprint area, less the areas where the DMR closure components include final surface rehabilitation and large open areas between surface infrastructure which is likely to not be disturbed, is applicable.

In terms of water management, final mineralised waste deposits (tailings, fines stockpiles and waste rock dumps) are applicable.

During initial construction, until such time as the offices and other staff and store facilities are constructed, temporary portable contractor facilities will be in place.

The specialist risk assessment including water pollution potential study is only applicable once the mine enters production.

3.3. CALCULATION RESULTS

The anticipated ramp up in the financial closure liability at Lehating Mine over the life of mine at Current Value (CV) is summarised in the table below. The liability calculations are provided in Appendix B.

Year	Financial Liability incurred during the year (incl. VAT)	Progressive Financial Liability (incl. VAT)	Progressive Liability as a % of LOM Liability
1	R 5 577 343.50	R 5 577 343.50	54.18%
2	R 2 650 740.85	R 8 228 084.35	79.93%
3	R 712 060.18	R 8 940 144.53	86.85%
4	R 0.00	R 8 940 144.53	86.85%
5	R 813 589.69	R 9 753 734.22	94.76%
6	R 23 008.89	R 9 776 743.11	94.98%
7	R 37 677.19	R 9 814 420.30	95.35%
8	R 23 008.89	R 9 837 429.18	95.57%
9	R 23 008.89	R 9 860 438.07	95.79%
10	R 37 677.19	R 9 898 115.26	96.16%
11 - LoM	R 395 465.93	R 10 293 581.19	100.00%

4. CONCLUSION

The financial closure liability associated with the Lehating Mine (as at 1 year from construction) will be **R 5 577 343.50 (including VAT)** – calculated at Current Value (CV) as at First Quarter 2015 and 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 Lehating Mine is anticipated to ramp up to **R 8 228 084.35 (CV incl. VAT)** by the end of the second year from start of construction, representing a progressive 79.93% of the anticipated Life of Mine (LoM) closure liability. Thereafter, incremental increases in the closure liability (at CV) are anticipated over the remaining construction phase as well as throughout the operational phase. This is attributed the underground nature of the mine.

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 Closure Components selected are in line with the project description and decommissioning and closure objectives detailed in Chapter 2 of the Environmental Impact Assessment And Environmental Management Programme Report For The Proposed Lehating Mine (SLR Project 710.12015.00001, Report No. 1, July 2013), prepared for Lehating Mining (Pty) Ltd.

The calculated 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, sealing of shafts and the maintenance and aftercare of all the rehabilitated sites.

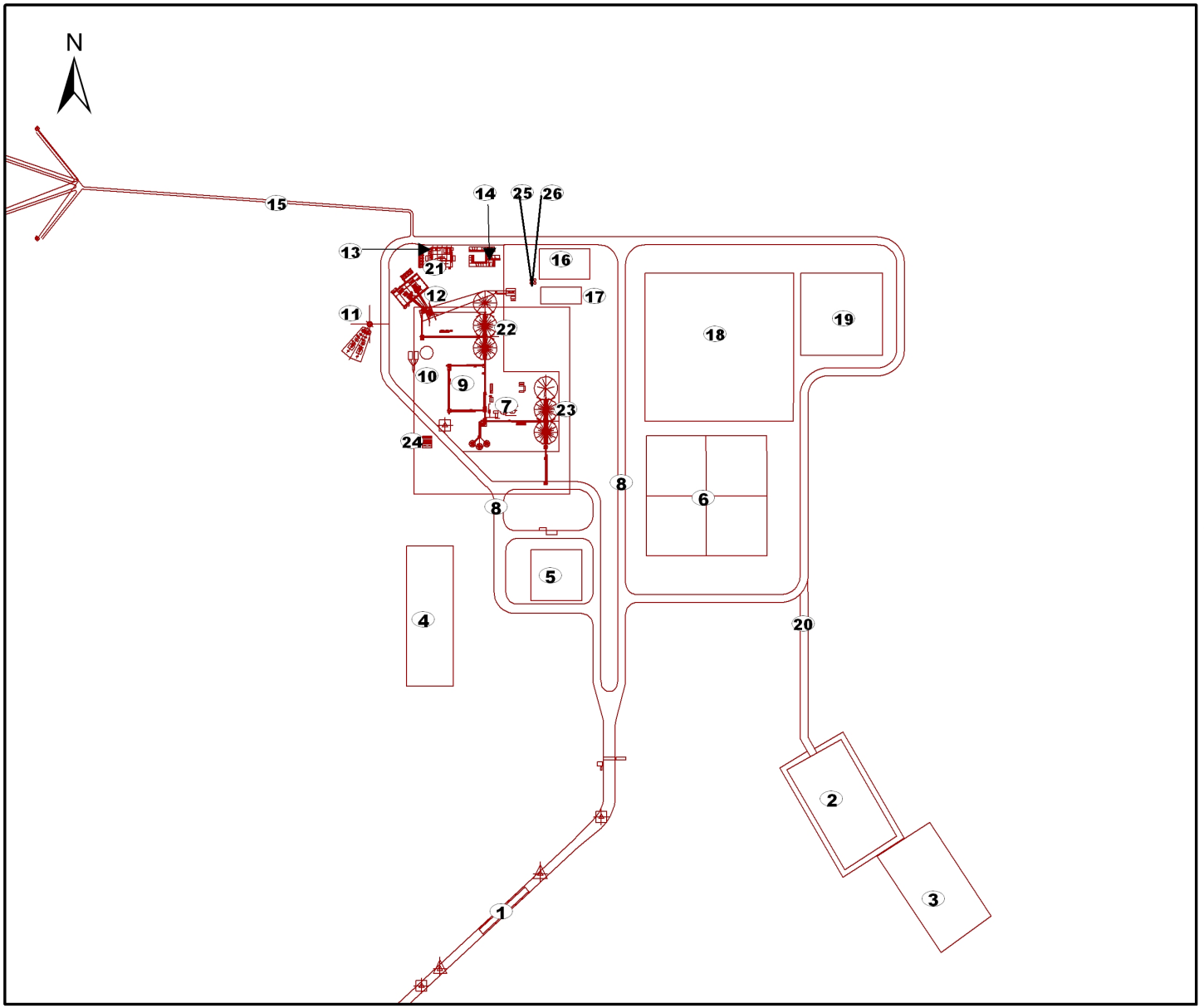
Site specific aspects such as surface and groundwater remediation have not been costed at this stage – the likelihood of such remediation would only be identified during the ongoing operation of the mine through surface and groundwater monitoring and/or by carrying out risk assessment and water pollution potential studies.

We trust you find the above in order. Should you have any queries, please do not hesitate to contact the undersigned.

Auther: Jonathan Mograbi (EAP) **Reviewer: Stephen van Niekerk (Pr Eng)**

For SLR Consulting (Africa) (Pty) Ltd

APPENDIX A: Areas of Disturbance for Lehating Mine



Legend

FID	Description
1	Access Road
2	Dirty Water Containment Facility (DWCF)
3	Emergency DWCF
4	Topsoil Stockpile
5	Stock Yard
6	Tailings Storage Facility
7	Process Water Tank
8	Internal Road
9	Process Plant
10	Settling Pond/s
11	Ventilation Shaft
12	Main Shaft
13	Store & Workshop
14	Office Block
15	Pipeline & Service Road to Water Supply Boreholes &WMF*
16	Salvage Yard
17	Contractor Laydown Area
18	Fines Stockpile
19	Waste Rock Stockpile
20	Storm Water Drainage Channel
21	Changehouse
22	Crushed Stockpiles
23	Product Stockpile
24	Substation & Generators
25	Fire Water Tank
26	Dust Suppression Supply Water
	*Waste Management Facility

Meters

0 150 300

Scale: 1:7 000

Projection: WG23

Datum: Hartbeeshoek 94

LEHATING MINING (PTY) LTD

Figure 18:

Proposed Conceptual Infrastructure Layout

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APPENDIX B: Closure Liability for Lehating Mine

Template for "rules-based" approach of the quantum for financial provision						
CALCULATION OF THE QUANTUM						
Mine:	**Lehating Mine**		Escalation (CPI):		**63.96%**	
Evaluator:	**SLR Consulting Africa (Pty) Ltd**		Terrain (Weighting factor1):		**1 (Flat)**	
Risk Class:	**High (Class A)**		Proximity (Weighting factor 2):		**1.05 (Peri-Urban)**	
Area Sensitivity:	**High**		Applicable Period:		**Year 1**	

Component No.	Main Description	Unit	Quantity	Escalated Rate	Weighing Factor 1	Cost
1	Dismantling of processing plant and related structures (including overland conveyors and power-lines)	m^3	0	11.18	1.00	0
2 (A)	Demolition of steel buildings and structures	m^2	0	155.76	1.00	0
2 (B)	Demolition of reinforced concrete buildings and structures	m^2	0	229.54	1.00	0
3	Rehabilitation of access roads	m^2	42 990	27.87	1.00	1 198 269
5	Demolition of housing and facilities	m^2	0	311.52	1.00	0
7	Sealing of shafts, adits and inclines	m^3	1 500	83.62	1.00	125 429
	Geotchnical investigation	Sum	1	81 980.00	1.00	81 980
8 (A)	Overburden and Spoils	ha	0.80	108 869.44	1.00	87 096
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt producing)	ha	0.00	135 594.92	1.00	0
10	General surface rehabilitation, including grassing of all denuded areas	ha	15.79	86 242.96	1.00	1 361 725
12	Fencing	m	4 814	98.38	1.00	473 582
13	Water management (separating clean and dirty water, managing polluted water and managing the impact on groundwater)	ha	0.80	32 792.00	1.00	26 234
14	2 to 3 years of maintenance and aftercare	ha	20.89	11 477.20	1.00	239 740
15 A	Specialist study - Overall quantified risk assessment incl. water pollution potential study	Sum	0.00	500 000	1.00	0
					Sub-Total 1	**3 594 054**
Administrative Costs as a % of Sub-Total 1	Preliminary and General	W.F. 2	1.05			471 720
		%	12.5%			
	Administrative and supervision costs		6.0%			215 643
	Engineering drawings and specifications		2.0%			71 881
	Engineering and procurement of specialist		2.5%			89 851
	Development of closure plan		2.5%			89 851
	Final groundwater modelling					
					Sub-Total 2	**4 533 001**
Contingency as a percentage of Sub- Total 1			10.0%			359 405
					Sub-Total 3	**4 892 407**
VAT			14.0%			684 937
					Total	**5 577 344**

Template for "rules-based" approach of the quantum for financial provision						
CALCULATION OF THE QUANTUM						
Mine:	**Lehating Mine**		Escalation (CPI):		**63.96%**	
Evaluator:	**SLR Consulting Africa (Pty) Ltd**		Terrain (Weighting factor1):		**1 (Flat)**	
Risk Class:	**High (Class A)**		Proximity (Weighting factor 2):		**1.05 (Peri-Urban)**	
Area Sensitivity:	**High**		Applicable Period:		**Year 2**	

Component No.	Main Description	Unit	Quantity	Escalated Rate	Weighing Factor 1	Cost
1	Dismantling of processing plant and related structures (including overland conveyors and power-lines)	m^3	0	11.18	1.00	0
2 (A)	Demolition of steel buildings and structures	m^2	214	155.76	1.00	33 333
2 (B)	Demolition of reinforced concrete buildings and structures	m^2	3 926	229.54	1.00	901 190
3	Rehabilitation of access roads	m^2	46 074	27.87	1.00	1 284 230
5	Demolition of housing and facilities	m^2	1 698	311.52	1.00	528 968
7	Sealing of shafts, adits and inclines	m^3	1 500	83.62	1.00	125 429
	Geotchnical investigation	Sum	1	81 980.00	1.00	81 980
8 (A)	Overburden and Spoils	ha	2.37	108 869.44	1.00	258 211
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt producing)	ha	0.00	135 594.92	1.00	0
10	General surface rehabilitation, including grassing of all denuded areas	ha	14.85	86 242.96	1.00	1 280 316
12	Fencing	m	4 814	98.38	1.00	473 582
13	Water management (separating clean and dirty water, managing polluted water and managing the impact on groundwater)	ha	2.37	32 792.00	1.00	77 774
14	2 to 3 years of maintenance and aftercare	ha	22.41	11 477.20	1.00	257 186
15 A	Specialist study - Overall quantified risk assessment incl. water pollution potential study	Sum	0.00	500 000	1.00	0
					Sub-Total 1	**5 302 199**
Administrative Costs as a % of Sub-Total 1	Preliminary and General	W.F. 2	1.05			695 914
		%	12.5%			
	Administrative and supervision costs		6.0%			318 132
	Engineering drawings and specifications		2.0%			106 044
	Engineering and procurement of specialist		2.5%			132 555
	Development of closure plan		2.5%			132 555
	Final groundwater modelling					
					Sub-Total 2	**6 687 398**
Contingency as a percentage of Sub- Total 1			10.0%			530 220
					Sub-Total 3	**7 217 618**
VAT			14.0%			1 010 466
					Total	**8 228 084**

Template for "rules-based" approach of the quantum for financial provision						
CALCULATION OF THE QUANTUM						
Mine:	**Lehating Mine**		Escalation (CPI):		**63.96%**	
Evaluator:	**SLR Consulting Africa (Pty) Ltd**		Terrain (Weighting factor1):		**1 (Flat)**	
Risk Class:	**High (Class A)**		Proximity (Weighting factor 2):		**1.05 (Peri-Urban)**	
Area Sensitivity:	**High**		Applicable Period:		**Year 3**	

Component No.	Main Description	Unit	Quantity	Escalated Rate	Weighing Factor 1	Cost
1	Dismantling of processing plant and related structures (including overland conveyors and power-lines)	m^3	6 076	11.18	1.00	67 942
2 (A)	Demolition of steel buildings and structures	m^2	214	155.76	1.00	33 333
2 (B)	Demolition of reinforced concrete buildings and structures	m^2	4 432	229.54	1.00	1 017 339
3	Rehabilitation of access roads	m^2	46 074	27.87	1.00	1 284 230
5	Demolition of housing and facilities	m^2	1 698	311.52	1.00	528 968
7	Sealing of shafts, adits and inclines - concrete capping	m^3	50	5 246.85	1.00	262 343
	Sealing of shafts, adits and inclines - backfill of shaft	m^3	1 500	53.75	1.00	80 625
	Sealing of shafts, adits and inclines - geotchnical investigation, survey	Sum	1	125 238.00	1.00	125 238
8 (A)	Overburden and Spoils	ha	2.70	108 869.44	1.00	294 220
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt producing)	ha	0.00	135 594.92	1.00	0
10	General surface rehabilitation, including grassing of all denuded areas	ha	14.46	86 242.96	1.00	1 247 427
12	Fencing	m	4 814	98.38	1.00	473 582
13	Water management (separating clean and dirty water, managing polluted water and managing the impact on groundwater)	ha	2.70	32 792.00	1.00	88 620
14	2 to 3 years of maintenance and aftercare	ha	22.41	11 477.20	1.00	257 186
15 A	Specialist study - Overall quantified risk assessment incl. water pollution potential study	Sum	0.00	500 000	1.00	0
					Sub-Total 1	**5 761 052**
Administrative Costs as a % of Sub-Total 1	Preliminary and General	W.F. 2	1.05			756 138
		%	12.5%			
	Administrative and supervision costs		6.0%			345 663
	Engineering drawings and specifications		2.0%			115 221
	Engineering and procurement of specialist		2.5%			144 026
	Development of closure plan		2.5%			144 026
	Final groundwater modelling					
					Sub-Total 2	**7 266 127**
Contingency as a percentage of Sub- Total 1			10.0%			576 105
					Sub-Total 3	**7 842 232**
VAT			14.0%			1 097 912
					Total	**8 940 145**

Template for "rules-based" approach of the quantum for financial provision						
CALCULATION OF THE QUANTUM						
Mine:	**Lehating Mine**		Escalation (CPI):	**63.96%**		
Evaluator:	**SLR Consulting Africa (Pty) Ltd**		Terrain (Weighting factor1):	**1 (Flat)**		
Risk Class:	**High (Class A)**		Proximity (Weighting factor 2):	**1.05 (Peri-Urban)**		
Area Sensitivity:	**High**		Applicable Period:	**Year 4**		

Component No.	Main Description	Unit	Quantity	Escalated Rate	Weighing Factor 1	Cost
1	Dismantling of processing plant and related structures (including overland conveyors and power-lines)	m^3	6 076	11.18	1.00	67 942
2 (A)	Demolition of steel buildings and structures	m^2	214	155.76	1.00	33 333
2 (B)	Demolition of reinforced concrete buildings and structures	m^2	4 432	229.54	1.00	1 017 339
3	Rehabilitation of access roads	m^2	46 074	27.87	1.00	1 284 230
5	Demolition of housing and facilities	m^2	1 698	311.52	1.00	528 968
7	Sealing of shafts, adits and inclines - concrete capping	m^3	50	5 246.85	1.00	262 343
	Sealing of shafts, adits and inclines - backfill of shaft	m^3	1 500	53.75	1.00	80 625
	Sealing of shafts, adits and inclines - geotchnical investigation, survey	Sum	1	125 238.00	1.00	125 238
8 (A)	Overburden and Spoils	ha	2.70	108 869.44	1.00	294 220
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt producing)	ha	0.00	135 594.92	1.00	0
10	General surface rehabilitation, including grassing of all denuded areas	ha	14.46	86 242.96	1.00	1 247 427
12	Fencing	m	4 814	98.38	1.00	473 582
13	Water management (separating clean and dirty water, managing polluted water and managing the impact on groundwater)	ha	2.70	32 792.00	1.00	88 620
14	2 to 3 years of maintenance and aftercare	ha	22.41	11 477.20	1.00	257 186
15 A	Specialist study - Overall quantified risk assessment incl. water pollution potential study	Sum	0.00	500 000	1.00	0
					Sub-Total 1	**5 761 052**
Administrative Costs as a % of Sub-Total 1	Preliminary and General	W.F. 2	1.05			756 138
		%	12.5%			
	Administrative and supervision costs		6.0%			345 663
	Engineering drawings and specifications		2.0%			115 221
	Engineering and procurement of specialist		2.5%			144 026
	Development of closure plan		2.5%			144 026
	Final groundwater modelling					
					Sub-Total 2	**7 266 127**
Contingency as a percentage of Sub- Total 1			10.0%			576 105
					Sub-Total 3	**7 842 232**
VAT			14.0%			1 097 912
					Total	**8 940 145**

Template for "rules-based" approach of the quantum for financial provision						
CALCULATION OF THE QUANTUM						
Mine:	**Lehating Mine**		Escalation (CPI):		**63.96%**	
Evaluator:	**SLR Consulting Africa (Pty) Ltd**		Terrain (Weighting factor1):		**1 (Flat)**	
Risk Class:	**High (Class A)**		Proximity (Weighting factor 2):		**1.05 (Peri-Urban)**	
Area Sensitivity:	**High**		Applicable Period:		**Year 5**	

Component No.	Main Description	Unit	Quantity	Escalated Rate	Weighing Factor 1	Cost
1	Dismantling of processing plant and related structures (including overland conveyors and power-lines)	m^3	6 076	11.18	1.00	67 942
2 (A)	Demolition of steel buildings and structures	m^2	214	155.76	1.00	33 333
2 (B)	Demolition of reinforced concrete buildings and structures	m^2	4 432	229.54	1.00	1 017 339
3	Rehabilitation of access roads	m^2	46 074	27.87	1.00	1 284 230
5	Demolition of housing and facilities	m^2	1 698	311.52	1.00	528 968
7	Sealing of shafts, adits and inclines - concrete capping	m^3	50	5 246.85	1.00	262 343
	Sealing of shafts, adits and inclines - backfill of shaft	m^3	1 500	53.75	1.00	80 625
	Sealing of shafts, adits and inclines - geotchnical investigation, survey	Sum	1	125 238.00	1.00	125 238
8 (A)	Overburden and Spoils	ha	2.50	108 869.44	1.00	272 446
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt producing)	ha	0.43	135 594.92	1.00	58 374
10	General surface rehabilitation, including grassing of all denuded areas	ha	14.23	86 242.96	1.00	1 227 548
12	Fencing	m	4 814	98.38	1.00	473 582
13	Water management (separating clean and dirty water, managing polluted water and managing the impact on groundwater)	ha	2.93	32 792.00	1.00	96 179
14	2 to 3 years of maintenance and aftercare	ha	22.41	11 477.20	1.00	257 186
15 A	Specialist study - Overall quantified risk assessment incl. water pollution potential study	Sum	1.00	500 000	1.00	500 000
					Sub-Total 1	**6 285 331**
Administrative Costs as a % of Sub-Total 1	Preliminary and General	W.F. 2	1.05			824 950
		%	12.5%			
	Administrative and supervision costs		6.0%			377 120
	Engineering drawings and specifications		2.0%			125 707
	Engineering and procurement of specialist		2.5%			157 133
	Development of closure plan		2.5%			157 133
	Final groundwater modelling					
					Sub-Total 2	**7 927 374**
Contingency as a percentage of Sub- Total 1			10.0%			628 533
					Sub-Total 3	**8 555 907**
VAT			14.0%			1 197 827
					Total	**9 753 734**

Template for "rules-based" approach of the quantum for financial provision						
CALCULATION OF THE QUANTUM						
Mine:	**Lehating Mine**		Escalation (CPI):		**63.96%**	
Evaluator:	**SLR Consulting Africa (Pty) Ltd**		Terrain (Weighting factor1):		**1 (Flat)**	
Risk Class:	**High (Class A)**		Proximity (Weighting factor 2):		**1.05 (Peri-Urban)**	
Area Sensitivity:	**High**		Applicable Period:		**Year 6**	

Component No.	Main Description	Unit	Quantity	Escalated Rate	Weighing Factor 1	Cost
1	Dismantling of processing plant and related structures (including overland conveyors and power-lines)	m^3	6 076	11.18	1.00	67 942
2 (A)	Demolition of steel buildings and structures	m^2	214	155.76	1.00	33 333
2 (B)	Demolition of reinforced concrete buildings and structures	m^2	4 432	229.54	1.00	1 017 339
3	Rehabilitation of access roads	m^2	46 074	27.87	1.00	1 284 230
5	Demolition of housing and facilities	m^2	1 698	311.52	1.00	528 968
7	Sealing of shafts, adits and inclines - concrete capping	m^3	50	5 246.85	1.00	262 343
	Sealing of shafts, adits and inclines - backfill of shaft	m^3	1 500	53.75	1.00	80 625
	Sealing of shafts, adits and inclines - geotchnical investigation, survey	Sum	1	125 238.00	1.00	125 238
8 (A)	Overburden and Spoils	ha	2.50	108 869.44	1.00	272 446
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt producing)	ha	0.61	135 594.92	1.00	82 848
10	General surface rehabilitation, including grassing of all denuded areas	ha	14.05	86 242.96	1.00	1 211 981
12	Fencing	m	4 814	98.38	1.00	473 582
13	Water management (separating clean and dirty water, managing polluted water and managing the impact on groundwater)	ha	3.11	32 792.00	1.00	102 098
14	2 to 3 years of maintenance and aftercare	ha	22.41	11 477.20	1.00	257 186
15 A	Specialist study - Overall quantified risk assessment incl. water pollution potential study	Sum	1.00	500 000	1.00	500 000
					Sub-Total 1	**6 300 158**
Administrative Costs as a % of Sub-Total 1	Preliminary and General	W.F. 2	1.05			826 896
		%	12.5%			
	Administrative and supervision costs		6.0%			378 009
	Engineering drawings and specifications		2.0%			126 003
	Engineering and procurement of specialist		2.5%			157 504
	Development of closure plan		2.5%			157 504
	Final groundwater modelling					
					Sub-Total 2	**7 946 075**
Contingency as a percentage of Sub- Total 1			10.0%			630 016
					Sub-Total 3	**8 576 090**
VAT			14.0%			1 200 653
					Total	**9 776 743**

Template for "rules-based" approach of the quantum for financial provision						
CALCULATION OF THE QUANTUM						
Mine:	**Lehating Mine**		Escalation (CPI):		**63.96%**	
Evaluator:	**SLR Consulting Africa (Pty) Ltd**		Terrain (Weighting factor1):		**1 (Flat)**	
Risk Class:	**High (Class A)**		Proximity (Weighting factor 2):		**1.05 (Peri-Urban)**	
Area Sensitivity:	**High**		Applicable Period:		**Year 7**	

Component No.	Main Description	Unit	Quantity	Escalated Rate	Weighing Factor 1	Cost
1	Dismantling of processing plant and related structures (including overland conveyors and power-lines)	m^3	6 076	11.18	1.00	67 942
2 (A)	Demolition of steel buildings and structures	m^2	214	155.76	1.00	33 333
2 (B)	Demolition of reinforced concrete buildings and structures	m^2	4 432	229.54	1.00	1 017 339
3	Rehabilitation of access roads	m^2	46 074	27.87	1.00	1 284 230
5	Demolition of housing and facilities	m^2	1 698	311.52	1.00	528 968
7	Sealing of shafts, adits and inclines - concrete capping	m^3	50	5 246.85	1.00	262 343
	Sealing of shafts, adits and inclines - backfill of shaft	m^3	1 500	53.75	1.00	80 625
	Sealing of shafts, adits and inclines - geotchnical investigation, survey	Sum	1	125 238.00	1.00	125 238
8 (A)	Overburden and Spoils	ha	2.30	108 869.44	1.00	250 672
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt producing)	ha	1.04	135 594.92	1.00	141 222
10	General surface rehabilitation, including grassing of all denuded areas	ha	13.82	86 242.96	1.00	1 192 102
12	Fencing	m	4 814	98.38	1.00	473 582
13	Water management (separating clean and dirty water, managing polluted water and managing the impact on groundwater)	ha	3.34	32 792.00	1.00	109 656
14	2 to 3 years of maintenance and aftercare	ha	22.41	11 477.20	1.00	257 186
15 A	Specialist study - Overall quantified risk assessment incl. water pollution potential study	Sum	1.00	500 000	1.00	500 000
					Sub-Total 1	**6 324 438**
Administrative Costs as a % of Sub-Total 1	Preliminary and General	W.F. 2	1.05			830 082
		%	12.5%			
	Administrative and supervision costs		6.0%			379 466
	Engineering drawings and specifications		2.0%			126 489
	Engineering and procurement of specialist		2.5%			158 111
	Development of closure plan		2.5%			158 111
	Final groundwater modelling					
					Sub-Total 2	**7 976 697**
Contingency as a percentage of Sub- Total 1			10.0%			632 444
					Sub-Total 3	**8 609 141**
VAT			14.0%			1 205 280
					Total	**9 814 420**

Template for "rules-based" approach of the quantum for financial provision						
CALCULATION OF THE QUANTUM						
Mine:	**Lehating Mine**		Escalation (CPI):		**63.96%**	
Evaluator:	**SLR Consulting Africa (Pty) Ltd**		Terrain (Weighting factor1):		**1 (Flat)**	
Risk Class:	**High (Class A)**		Proximity (Weighting factor 2):		**1.05 (Peri-Urban)**	
Area Sensitivity:	**High**		Applicable Period:		**Year 8**	

Component No.	Main Description	Unit	Quantity	Escalated Rate	Weighing Factor 1	Cost
1	Dismantling of processing plant and related structures (including overland conveyors and power-lines)	m^3	6 076	11.18	1.00	67 942
2 (A)	Demolition of steel buildings and structures	m^2	214	155.76	1.00	33 333
2 (B)	Demolition of reinforced concrete buildings and structures	m^2	4 432	229.54	1.00	1 017 339
3	Rehabilitation of access roads	m^2	46 074	27.87	1.00	1 284 230
5	Demolition of housing and facilities	m^2	1 698	311.52	1.00	528 968
7	Sealing of shafts, adits and inclines - concrete capping	m^3	50	5 246.85	1.00	262 343
	Sealing of shafts, adits and inclines - backfill of shaft	m^3	1 500	53.75	1.00	80 625
	Sealing of shafts, adits and inclines - geotchnical investigation, survey	Sum	1	125 238.00	1.00	125 238
8 (A)	Overburden and Spoils	ha	2.30	108 869.44	1.00	250 672
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt producing)	ha	1.22	135 594.92	1.00	165 697
10	General surface rehabilitation, including grassing of all denuded areas	ha	13.64	86 242.96	1.00	1 176 535
12	Fencing	m	4 814	98.38	1.00	473 582
13	Water management (separating clean and dirty water, managing polluted water and managing the impact on groundwater)	ha	3.52	32 792.00	1.00	115 575
14	2 to 3 years of maintenance and aftercare	ha	22.41	11 477.20	1.00	257 186
15 A	Specialist study - Overall quantified risk assessment incl. water pollution potential study	Sum	1.00	500 000	1.00	500 000
					Sub-Total 1	**6 339 265**
Administrative Costs as a % of Sub-Total 1	Preliminary and General	W.F. 2	1.05			832 028
		%	12.5%			
	Administrative and supervision costs		6.0%			380 356
	Engineering drawings and specifications		2.0%			126 785
	Engineering and procurement of specialist		2.5%			158 482
	Development of closure plan		2.5%			158 482
	Final groundwater modelling					
					Sub-Total 2	**7 995 397**
Contingency as a percentage of Sub- Total 1			10.0%			633 926
					Sub-Total 3	**8 629 324**
VAT			14.0%			1 208 105
					Total	**9 837 429**

Template for "rules-based" approach of the quantum for financial provision						
CALCULATION OF THE QUANTUM						
Mine:	**Lehating Mine**		Escalation (CPI):		**63.96%**	
Evaluator:	**SLR Consulting Africa (Pty) Ltd**		Terrain (Weighting factor1):		**1 (Flat)**	
Risk Class:	**High (Class A)**		Proximity (Weighting factor 2):		**1.05 (Peri-Urban)**	
Area Sensitivity:	**High**		Applicable Period:		**Year 9**	

Component No.	Main Description	Unit	Quantity	Escalated Rate	Weighing Factor 1	Cost
1	Dismantling of processing plant and related structures (including overland conveyors and power-lines)	m^3	6 076	11.18	1.00	67 942
2 (A)	Demolition of steel buildings and structures	m^2	214	155.76	1.00	33 333
2 (B)	Demolition of reinforced concrete buildings and structures	m^2	4 432	229.54	1.00	1 017 339
3	Rehabilitation of access roads	m^2	46 074	27.87	1.00	1 284 230
5	Demolition of housing and facilities	m^2	1 698	311.52	1.00	528 968
7	Sealing of shafts, adits and inclines - concrete capping	m^3	50	5 246.85	1.00	262 343
	Sealing of shafts, adits and inclines - backfill of shaft	m^3	1 500	53.75	1.00	80 625
	Sealing of shafts, adits and inclines - geotchnical investigation, survey	Sum	1	125 238.00	1.00	125 238
8 (A)	Overburden and Spoils	ha	2.30	108 869.44	1.00	250 672
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt producing)	ha	1.40	135 594.92	1.00	190 172
10	General surface rehabilitation, including grassing of all denuded areas	ha	13.46	86 242.96	1.00	1 160 968
12	Fencing	m	4 814	98.38	1.00	473 582
13	Water management (separating clean and dirty water, managing polluted water and managing the impact on groundwater)	ha	3.71	32 792.00	1.00	121 494
14	2 to 3 years of maintenance and aftercare	ha	22.41	11 477.20	1.00	257 186
15 A	Specialist study - Overall quantified risk assessment incl. water pollution potential study	Sum	1.00	500 000	1.00	500 000
					Sub-Total 1	**6 354 092**
Administrative Costs as a % of Sub-Total 1	Preliminary and General	W.F. 2	1.05			833 975
		%	12.5%			
	Administrative and supervision costs		6.0%			381 245
	Engineering drawings and specifications		2.0%			127 082
	Engineering and procurement of specialist		2.5%			158 852
	Development of closure plan		2.5%			158 852
	Final groundwater modelling					
					Sub-Total 2	**8 014 098**
Contingency as a percentage of Sub- Total 1			10.0%			635 409
					Sub-Total 3	**8 649 507**
VAT			14.0%			1 210 931
					Total	**9 860 438**

Template for "rules-based" approach of the quantum for financial provision						
CALCULATION OF THE QUANTUM						
Mine:	**Lehating Mine**		Escalation (CPI):	**63.96%**		
Evaluator:	**SLR Consulting Africa (Pty) Ltd**		Terrain (Weighting factor1):	**1 (Flat)**		
Risk Class:	**High (Class A)**		Proximity (Weighting factor 2):	**1.05 (Peri-Urban)**		
Area Sensitivity:	**High**		Applicable Period:	**Year 10**		

Component No.	Main Description	Unit	Quantity	Escalated Rate	Weighing Factor 1	Cost
1	Dismantling of processing plant and related structures (including overland conveyors and power-lines)	m^3	6 076	11.18	1.00	67 942
2 (A)	Demolition of steel buildings and structures	m^2	214	155.76	1.00	33 333
2 (B)	Demolition of reinforced concrete buildings and structures	m^2	4 432	229.54	1.00	1 017 339
3	Rehabilitation of access roads	m^2	46 074	27.87	1.00	1 284 230
5	Demolition of housing and facilities	m^2	1 698	311.52	1.00	528 968
7	Sealing of shafts, adits and inclines - concrete capping	m^3	50	5 246.85	1.00	262 343
	Sealing of shafts, adits and inclines - backfill of shaft	m^3	1 500	53.75	1.00	80 625
	Sealing of shafts, adits and inclines - geotchnical investigation, survey	Sum	1	125 238.00	1.00	125 238
8 (A)	Overburden and Spoils	ha	2.10	108 869.44	1.00	228 898
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt producing)	ha	1.83	135 594.92	1.00	248 545
10	General surface rehabilitation, including grassing of all denuded areas	ha	13.23	86 242.96	1.00	1 141 089
12	Fencing	m	4 814	98.38	1.00	473 582
13	Water management (separating clean and dirty water, managing polluted water and managing the impact on groundwater)	ha	3.94	32 792.00	1.00	129 053
14	2 to 3 years of maintenance and aftercare	ha	22.41	11 477.20	1.00	257 186
15 A	Specialist study - Overall quantified risk assessment incl. water pollution potential study	Sum	1.00	500 000	1.00	500 000
					Sub-Total 1	**6 378 371**
Administrative Costs as a % of Sub-Total 1	Preliminary and General	W.F. 2	1.05			837 161
		%	12.5%			
	Administrative and supervision costs		6.0%			382 702
	Engineering drawings and specifications		2.0%			127 567
	Engineering and procurement of specialist		2.5%			159 459
	Development of closure plan		2.5%			159 459
	Final groundwater modelling					
					Sub-Total 2	**8 044 720**
Contingency as a percentage of Sub- Total 1			10.0%			637 837
					Sub-Total 3	**8 682 557**
VAT			14.0%			1 215 558
					Total	**9 898 115**

Template for "rules-based" approach of the quantum for financial provision						
CALCULATION OF THE QUANTUM						
Mine:	**Lehating Mine**		Escalation (CPI):	**63.96%**		
Evaluator:	**SLR Consulting Africa (Pty) Ltd**		Terrain (Weighting factor1):	**1 (Flat)**		
Risk Class:	**High (Class A)**		Proximity (Weighting factor 2):	**1.05 (Peri-Urban)**		
Area Sensitivity:	**High**		Applicable Period:	**Year 24 (end of life)**		

Component No.	Main Description	Unit	Quantity	Escalated Rate	Weighing Factor 1	Cost
1	Dismantling of processing plant and related structures (including overland conveyors and power-lines)	m^3	6 076	11.18	1.00	67 942
2 (A)	Demolition of steel buildings and structures	m^2	214	155.76	1.00	33 333
2 (B)	Demolition of reinforced concrete buildings and structures	m^2	4 432	229.54	1.00	1 017 339
3	Rehabilitation of access roads	m^2	46 074	27.87	1.00	1 284 230
5	Demolition of housing and facilities	m^2	1 698	311.52	1.00	528 968
7	Sealing of shafts, adits and inclines - concrete capping	m^3	50	5 246.85	1.00	262 343
	Sealing of shafts, adits and inclines - backfill of shaft	m^3	1 500	53.75	1.00	80 625
	Sealing of shafts, adits and inclines - geotchnical investigation, survey	Sum	1	125 238.00	1.00	125 238
8 (A)	Overburden and Spoils	ha	1.10	108 869.44	1.00	120 029
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt producing)	ha	5.61	135 594.92	1.00	760 688
10	General surface rehabilitation, including grassing of all denuded areas	ha	10.45	86 242.96	1.00	901 593
12	Fencing	m	4 814	98.38	1.00	473 582
13	Water management (separating clean and dirty water, managing polluted water and managing the impact on groundwater)	ha	6.71	32 792.00	1.00	220 116
14	2 to 3 years of maintenance and aftercare	ha	22.41	11 477.20	1.00	257 186
15 A	Specialist study - Overall quantified risk assessment incl. water pollution potential study	Sum	1.00	500 000	1.00	500 000
					Sub-Total 1	**6 633 210**
Administrative Costs as a % of Sub-Total 1	Preliminary and General	W.F. 2	1.05			870 609
		%	12.5%			
	Administrative and supervision costs		6.0%			397 993
	Engineering drawings and specifications		2.0%			132 664
	Engineering and procurement of specialist		2.5%			165 830
	Development of closure plan		2.5%			165 830
	Final groundwater modelling					
					Sub-Total 2	**8 366 136**
Contingency as a percentage of Sub- Total 1			10.0%			663 321
					Sub-Total 3	**9 029 457**
VAT			14.0%			1 264 124
					Total	**10 293 581**

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 (18º) 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.

The unit cost is based on filling and capping of both vertical and inclined shafts of dimensions 12,5 m diameter and 5,5 x 5,5 m respectively. The Master Rate allows for the average cost of rendering both vertical and an incline shafts safe.

The costs of geotechnical investigations and surveying were fixed at R50 000 and R20 000 respectively. Professional fees were taken at 2,5 % of the rehabilitation cost. Supervision fees were not included.

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.

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.