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**Triaxial Compression Test Results** 

 Project:
 MOONLIGHT
 Date Tested:
 26/05/2011

 Batch No.:
 1039/F02/05/2011
 Laboratory Number:
 C372

 Field Sample Number:
 TP 27
 Depth (m):

This test was carried out in accordance with BS 1377:Part 8:1990 Clause 4,5,6,7

Remarks: A Consolidated Undrained test on a remoulded sample tested saturated. Multistage

Loading.

Deviator stress corrections: Membrane correction: 1.10250856561531 kPa

### SATURATION DATA

Test No. 2

Saturation method: Alternating	g increments of cell- & back pressure	
Pressure increments applied (kPa):	50,70,100,100,100	Differential pressure (kPa): 10.0
Final cell pressure (kPa): 453.0	Final back pressure (kPa): 443.0	Final B parameter: 0.95

### **CONSOLIDATION DATA**

Effective cons. Stress (kPa):		99.7 t100 (minutes): 60		Side	Side drains fitted: No			
	Height	Diameter	Area	Moisture	Dry Unit	Void	Saturation	Specific
\	mm	mm	mm <sup>2</sup>	Content %	Weight	Ratio	%	Gravity
ITIAL (Before saturation)	* 92.74	* 51.70	2099.31	8.2	1.785	0.6646	37	0.071
NSOLIDATED	92.27	51.44	2077.94	21.9	1.813	0.6391	102	2.971 Determined
FINAL (After shear)	85.31	53.49	2247.42	21.9	1.812	0.6392	102	Determined
Initial pore pressure (kPa): 443.3 Fin		Fina	pore pres	sure (kPa):	443.2	Pore press	ure dissipation	n: 33%
*: Measured dimensions; a	Il other dir	nensions ar	e calculate	d.				

# SHEAR DATA

Rate of strain (%/hour):	9						
Initial pore pressure (kPa):	443.3	Initial effective s	tress (kPa): 99	.7			
Failure Criterion: Ma	ax. Effect	ive Principle Stres	s Ratio				
Axial strain at failure (%):	0	0.60					
Deviator stress (kPa):	3	384.2			Principle Str	esses (kPa)	
Excess pore pressure (kPa):	1	8.6		σ1	σ1'	<b>O</b> 3	<b>σ</b> 3'
Effective principle stress ratio	): 5	5.741		483.9	465.2	99.7	81.0

Deviator Stress and dPore Pressure vs Strain Specimen Failure **Deviator Stress** - - d.Pore Pressure ----- Effective principle stress ratio 6 500 5.5 400 5 4.5.4 4.5.4 5.5.4 5.5.4 7.5.4 Deviator Stress (kPa) 3 2.5 A 2 1.5 Effective 0 -100 2.0 4.0 8.0 0.0 Axial Strain %



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**Triaxial Compression Test Results** 

Project:	MOONLIGHT	Date Tested:	26/05/2011
Batch No.:	1039/F02/05/2011	Laboratory Number:	C372
Field Sample Number:	TP 27	Depth (m):	

This test was carried out in accordance with BS 1377:Part 8:1990 Clause 4,5,6,7

Remarks: A Consolidated Undrained test on a remoulded sample tested saturated. Multistage Loading.

# SATURATION DATA Test No. 3

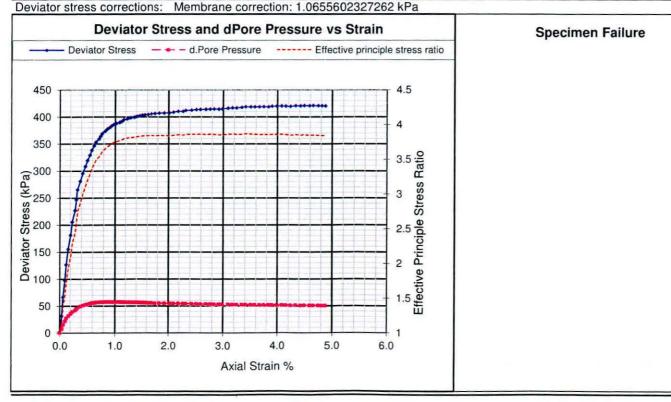
Saturation method: Alternatin	g increments of cell- & back pressure	
Pressure increments applied (kPa):	50,70,100,100,100	Differential pressure (kPa): 10.0
Final cell pressure (kPa): 453.0	Final back pressure (kPa): 443.0	Final B parameter: 0.95

### **CONSOLIDATION DATA**

Effective cons. Stress (kPa):		198.2	98.2 t100 (minutes): 120		Side drains fitted: No		No	
	Height	Diameter	Area	Moisture	Dry Unit	Void	Saturation	Specific
	mm	mm	mm <sup>2</sup>	Content %	Weight	Ratio	%	Gravity
INITIAL (Before saturation)	* 85.30	* 53.49	2247.42	8.2	1.813	0.6390	38	
CONSOLIDATED	84.46	52.96	2202.95	20.3	1.868	0.5903	102	2.971 Determine
FINAL (After shear)	80.34	54.30	2315.88	20.3	1.868	0.5907	102	Determined
Initial pore pressure (kPa): 443.2 Fin		Fina	pore pres	sure (kPa):	443.0	Pore pressi	ure dissipation	n: 100%
*: Measured dimensions; a	II other din	nensions ar	e calculate	d.				

### SHEAR DATA

Rate of strain (%/hour): 4.8					
Initial pore pressure (kPa): 444.8	Initial effective stress	s (kPa): 198.2			
Failure Criterion: Max. Eff	ective Principle Stress Ra	atio			
Axial strain at failure (%):	3.41				
Deviator stress (kPa):	418.7	*	Principle St	resses (kPa)	
Excess pore pressure (kPa):	52.0	σ1	σ1'	σ3	σ3'
Effective principle stress ratio:	3.864	616.9	564.9	198.2	146.2



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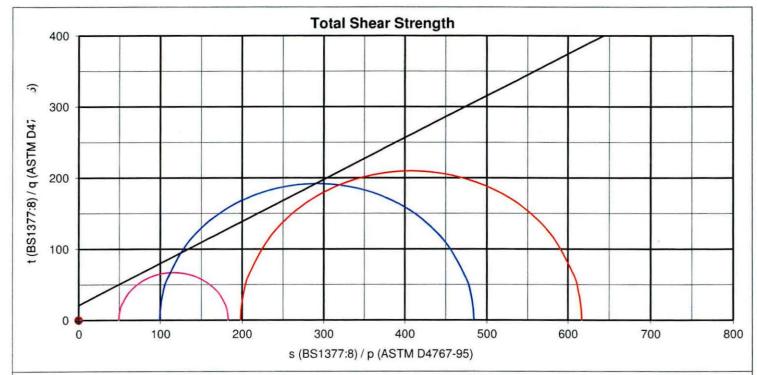
Civil Engineering Testing Laboratory

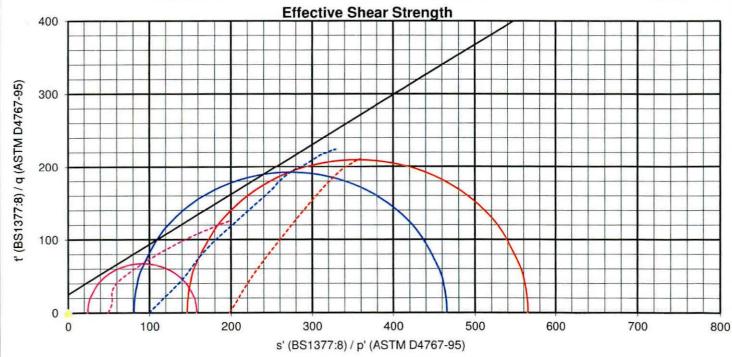
# **Triaxial Compression Test Results**

Project:	MOONLIGHT	Date Tested:	26/05/2011	
Proj.No.:	1039/F02/05/2011	Laboratory Number:	C372	
Field Sample Reference:	TP 27	Depth (m):	_	

# Mohr Stress Circles

	COHESION (kPa)	FRICTION ANGLE
TOTAL STRESSES	21	31
EFFECTIVE STRESSES	25	34

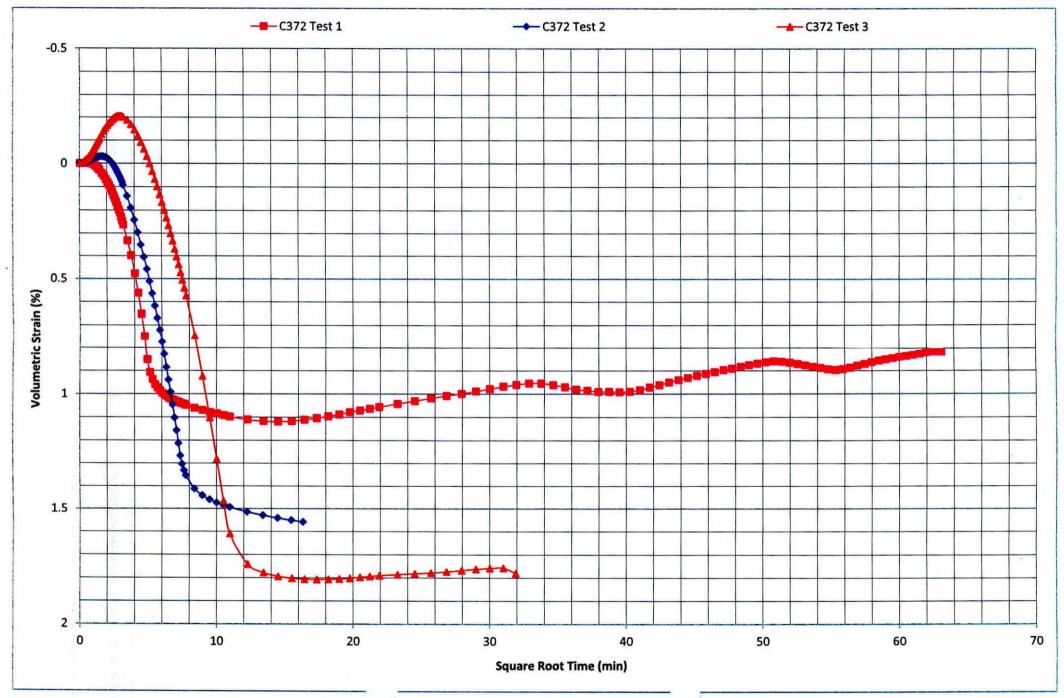




A Consolidated Undrained test on a remoulded sample tested saturated.

# **Consolidation vs Square Root Time**







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**Triaxial Compression Test Results** 

Project:	MOONLIGHT	Date Tested:	26/05/2011
Batch No.:	1039/F02/05/2011	Laboratory Number:	C373
Field Sample Number:	TP 22	Depth (m):	

This test was carried out in accordance with BS 1377:Part 8:1990 Clause 4,5,6,7

Remarks:

A Consolidated Undrained test on a remoulded sample tested saturated.

### **SATURATION DATA**

# Test No. 1

Saturation method:	Alternating	g increments of cell- & back pressure	
Pressure increments app	olied (kPa):	50,70,100,100,100	Differential pressure (kPa): 10.0
Final cell pressure (kPa)	355.0	Final back pressure (kPa): 345.0	Final B parameter: 0.95

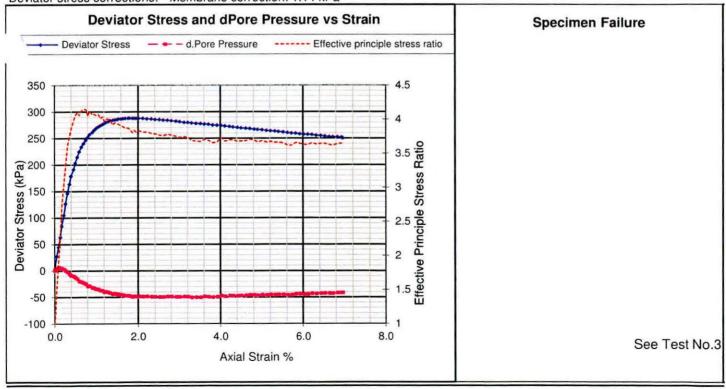
### **CONSOLIDATION DATA**

Effective cons. Stress (kPa):		53.2	2 t100 (minutes): 3.7		Side drains fitted: No			
	Height	Diameter	Area	Moisture	Dry Unit	Void	Saturation	Specific
1	mm	mm	mm <sup>2</sup>	Content %	Weight	Ratio	%	Gravity
TIAL (Before saturation)	* 100.00	* 50.00	1963.50	6.9	2.084	0.3367	57	0.705
ONSOLIDATED	99.81	49.91	1956.16	11.8	2.095	0.3292	100	2.785 Assumed
FINAL (After shear)	92.86	51.74	2102.58	11.8	2.095	0.3292	100	Assumed
Initial pore pressure (kPa):383.1 Final		pore pres	sure (kPa):	345.0	Pore pressu	ure dissipatio	n: 100%	
*: Measured dimensions; a	II other din	nensions ar	e calculate	ed.				

### SHEAR DATA

Rate of strain (%/hour): 9					
Initial pore pressure (kPa): 341.8	Initial effective stress	(kPa): 53.2			
Failure Criterion: Max. E	ffective Principle Stress Rat	io			
Axial strain at failure (%):	0.71				
Deviator stress (kPa):	240.2		Principle Str	esses (kPa)	
Excess pore pressure (kPa):	-23.2	σ1	σ1'	<b>O</b> 3	σ3'
Effective principle stress ratio:	4.142	293.4	316.7	53.2	76.5

Deviator stress corrections: Membrane correction: 1.14 kPa



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**Triaxial Compression Test Results** 

Project:	MOONLIGHT	Date Tested:	26/05/2011
Batch No.:	1039/F02/05/2011	Laboratory Number:	C373
Field Sample Number:	TP 22	Depth (m):	-

This test was carried out in accordance with BS 1377:Part 8:1990 Clause 4,5,6,7

Remarks:

A Consolidated Undrained test on a remoulded sample tested saturated. Multistage

Loading.

### **SATURATION DATA**

Test No. 2

Saturation method: Altern	ating increments of cell- & back pressure	
Pressure increments applied (kP	a): 50,70,100,100,100	Differential pressure (kPa): 10.0
Final cell pressure (kPa): 352.0	Final back pressure (kPa): 342.0	Final B parameter: 0.95

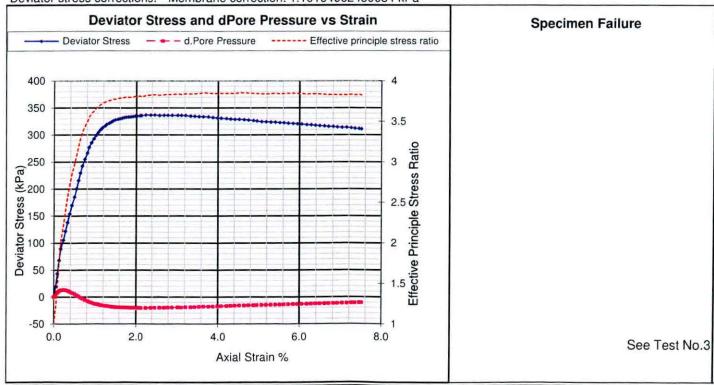
# **CONSOLIDATION DATA**

Effective cons. Stress (kPa):		99.1	t100 (minutes): 58		Side drains fitted: No		No	
	Height	Diameter	Area	Moisture	Dry Unit	Void	Saturation	Specific
	mm	mm	mm <sup>2</sup>	Content %	Weight	Ratio	%	Gravity
INITIAL (Before saturation)	* 92.86	* 51.74	2102.58	6.9	2.095	0.3292	59	0.705
CONSOLIDATED	92.58	51.58	2089.59	11.3	2.115	0.3169	100	2.785 Assumed
FINAL (After shear)	85.63	53.63	2259.15	11.3	2.115	0.3169	100	Assumed
Initial pore pressure (kPa):	Pa): 342.1 Final pore pressure (kPa): 342.0 Pore pressure dissipation: 100%					n: 100%		
*: Measured dimensions; a	all other din	nensions ar	e calculate	d.				

### SHEAR DATA

Rate of strain (%/hour):	9					
Initial pore pressure (kPa): 34	42.9	Initial effective stress (k	Pa): 99.1			
Failure Criterion: Max	c. Deviator	Stress				
Axial strain at failure (%):	2.24					
Deviator stress (kPa):	337.	337.1 Principle Stresses (kPa			esses (kPa	)
Excess pore pressure (kPa):	-20.	5	σ1	σ1'	σ3	σ3'
Effective principle stress ratio:	3.81	8	436.2	456.7	99.1	119.6

Deviator stress corrections: Membrane correction: 1.10164962459034 kPa



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Civil Engineering Testing Laboratory

**Triaxial Compression Test Results** 

Project:	MOONLIGHT	Date Tested:	26/05/2011
Batch No.:	1039/F02/05/2011	Laboratory Number:	C373
Field Sample Number:	TP 22	Depth (m):	

This test was carried out in accordance with BS 1377:Part 8:1990 Clause 4,5,6,7

Remarks:

A Consolidated Undrained test on a remoulded sample tested saturated. Multistage

Loading.

### SATURATION DATA

Test No. 3

Saturation method: Alternating	g increments of cell- & back pressure	
Pressure increments applied (kPa):	50,70,100,100,100	Differential pressure (kPa): 10.0
Final cell pressure (kPa): 351.0	Final back pressure (kPa): 341.0	Final B parameter: 0.95

### **CONSOLIDATION DATA**

Effective cons. Stress (kPa	a):	199.3	t100	(minutes):	120	Side	drains fitted:	No
	Height	Diameter	Area	Moisture	Dry Unit	Void	Saturation	Specific
7	mm	mm	mm <sup>2</sup>	Content %	Weight	Ratio	%	Gravity
'TIAL (Before saturation)	* 85.63	* 53.63	2259.15	6.9	2.115	0.3169	61	2.785
ONSOLIDATED	85.11	53.31	2231.90	10.5	2.154	0.2931	100	Assumed
FINAL (After shear)	79.19	55.27	2398.85	10.5	2.154	0.2932	100	Assumed
Initial pore pressure (kPa):	341.6	Final pore pressure (kPa): 341.5 Pore pressure dissipation:				n: 17%		
*: Measured dimensions; a	II other din	nensions ar	e calculate	d.				

### SHEAR DATA

Rate of strain (%/hour): 4.8					
Initial pore pressure (kPa): 341.	7 Initial effective stres	s (kPa): 199.3			
Failure Criterion: Max. D	eviator Stress				
Axial strain at failure (%):	3.48				
Deviator stress (kPa):	489.4 Principle Stresses (kPa)				
Excess pore pressure (kPa):	20.9	σ1	σ1'	σ3	<b>O</b> 3'
Effective principle stress ratio:	3.743	688.6	667.8	199.3	178.4
Deviator stress corrections: Membra	ne correction: 1.062790636103	362 kPa			

Deviator Stress and dPore Pressure vs Strain **Deviator Stress** — ← − d.Pore Pressure ----- Effective principle stress ratio 600 4 500 3.5 2 5 2 Effective Principle Stress Ratio Deviator Stress (kPa) 100 2.0 0.0 4.0 6.0 8.0 Axial Strain %



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# **Triaxial Compression Test Results**

Project:	MOONLIGHT	Date Tested:	26/05/2011
Proj.No.:	1039/F02/05/2011	Laboratory Number:	C373
Field Sample Reference:	TP 22	Depth (m):	-

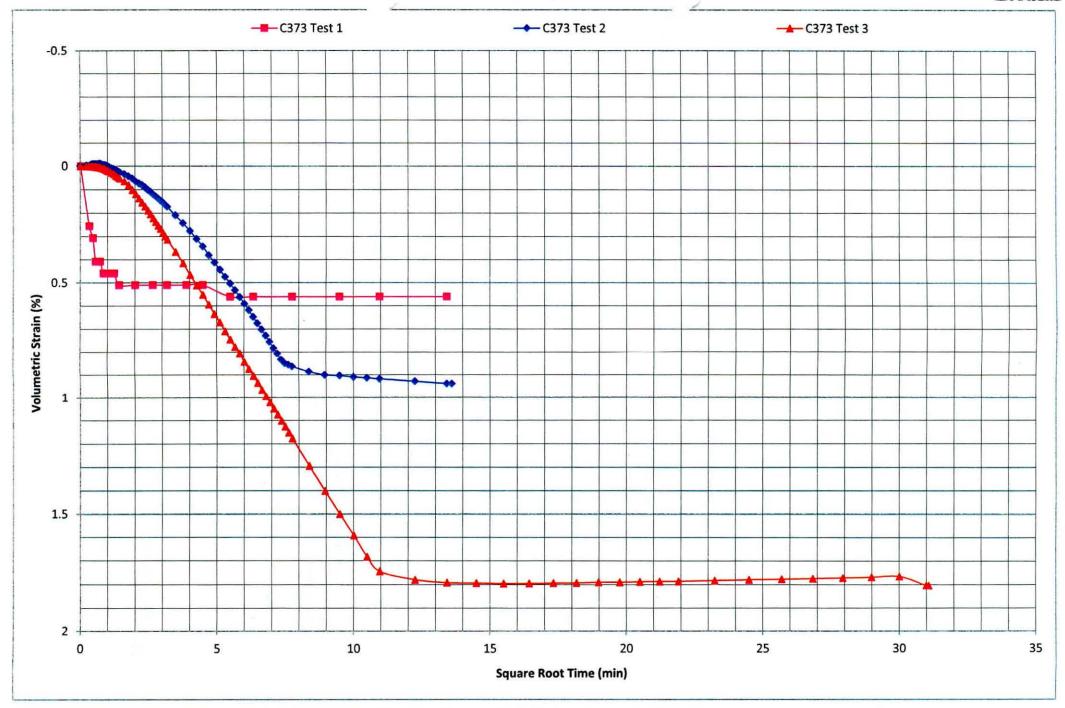
# Mohr Stress Circles

	COHESION (kPa)	FRICTION ANGLE
TOTAL STRESSES	48	27
EFFECTIVE STRESSES	13	33





A Consolidated Undrained test on a remoulded sample tested saturated.



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# Flexible Wall Constant Head Permeability Test Results

PROJECT:	MOONLIGHT	DATE : 15/06/2011
PROJECT No.:	F02/05/2011	

Field Sample	Sample Depth	Moisture (%)		Dry Density		fficient of eability (m/s	3)
Number	in	Before Test	After Test	(Kg/m <sup>3</sup> )	Ran Minimum		_
	metres	rest	rest		Minimum	Maximum	Average
TP 27 (C372)	-	15.4	19.7	1782	7.4E-10	1.6E-09	1.1E-09
TP 22 (C373)	, <b>=</b> >	7.8	12.3	2057	9.3E-07	1.3E-06	1.1E-06

REMARKS:

Remoulded samples

Effective cell pressure 100kPa. Pressure Difference = 20 kPa

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# **CRUMB TEST RESULTS**

 Project
 : MOONLIGHT

 Project No. : 1039/F02/05/2011
 Date : 19 MAY 2011

Lab. Sample Ref.	Field Sample Ref.	Depth (m)	Dispersive Grade
C372	TP 27	-	3
C373	TP 22		1

#### Remarks:

Grade 1 - Non Dispersive
Grade 2 - Intermediate
Grade 3 - Dispersive
Grade 4 - Dispersive

Results reported relate only to the samples tested.

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While every care is taken to ensure that all tests are carried out in accordance with recognised standards, neither **Civilab** nor its employees shall be liable in any way whatsoever for any error made in the execution or reporting of tests or any erroneous conclusions drawn therefrom or for any consequences thereof.



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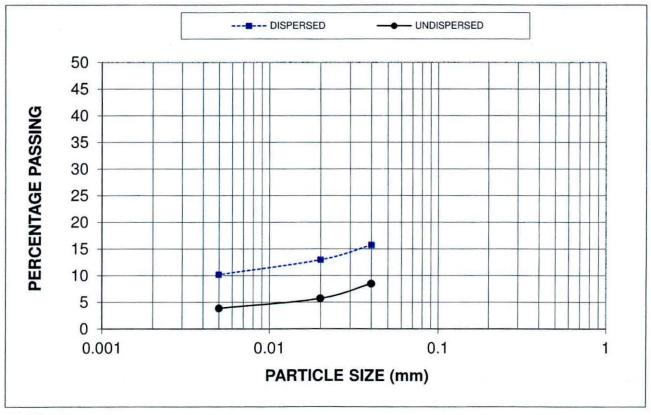
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# **Double Hydrometer Test Result**

Project:	MOONLIGHT			
Project No.:	F02/05/2011	Date:	19/05/2011	
Field Reference:	TP 27	Laboratory Ref.:	C372	
Depth (m):		Remarks:		

% DISPERSION:	38	



### NOTE:

The sample was tested according to ASTM test method D4221- 99
The results relate only to the sample tested.
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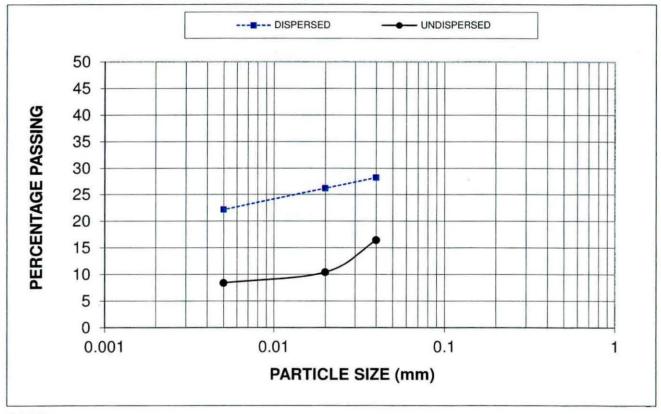
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# **Double Hydrometer Test Result**

Project:	MOONLIGHT			
Project No.:	F02/05/2011	Date:	19/05/2011	
Field Reference:	TP 22	Laboratory Ref.:	C373	
Depth (m):	-	Remarks:		

		38	% DISPERSION:
--	--	----	---------------



### NOTE:

The sample was tested according to ASTM test method D4221- 99

The results relate only to the sample tested.

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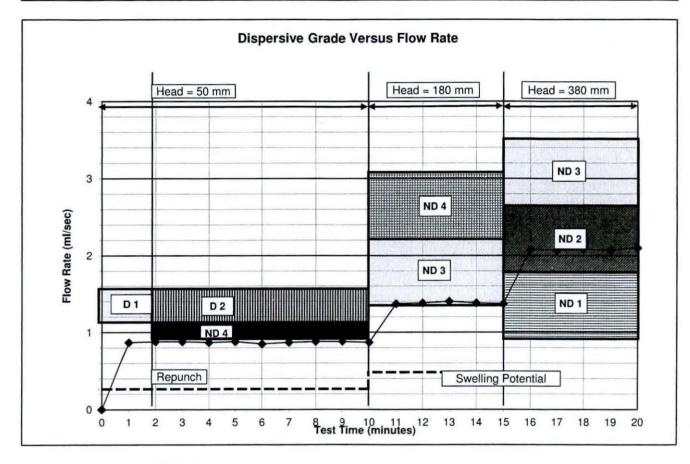


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# **Dispersive Grade Versus Flow Rate**

PROJECT:	MOONLIGHT	DATE:	19/05/2011	
PROJECT NUME	BER: F02/05/2011	LAB REFERENCE:	C372	
FIELD REFEREN	NCE: TP 27	DEPTH:		

Dispersive Grade Classification:	ND 2		
DRY DENS: <b>1675</b> kg/m <sup>3</sup>	MOISTURE CONTENT:	17.9	%



Hole size after test:

0 mm

### **Effluent Turbidity**

### **Dispersive Grade Classification**

50	Colour:	Clear	D 1	Dispersive
mm	Particles:	None	D 2	16
180	Colour:	Clear	ND 4	Intermediate
mm	Particles:	None	ND 3	
380	Colour:	Clear	ND 2	Non Dispersive
mm	Particles:	None	ND 1	

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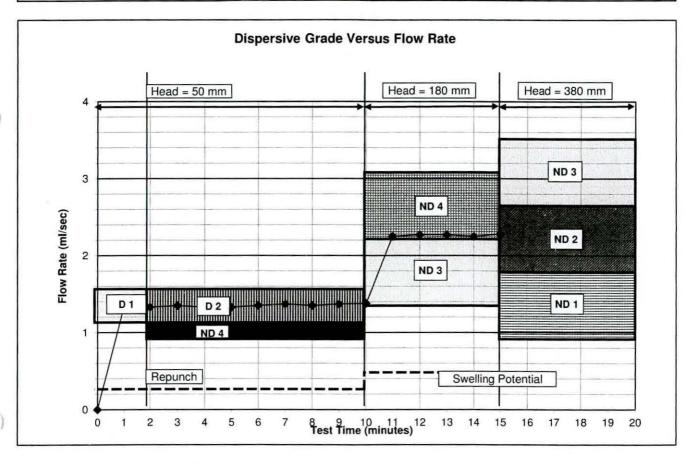


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# **Dispersive Grade Versus Flow Rate**

PROJECT:	MOONLIGHT	DATE:	19/05/2011
PROJECT NUMBER	R: F02/05/2011	LAB REFERENCE:	C373
FIELD REFERENCE	: TP 22	DEPTH:	

Dispersive Grade	Classification:	ND 4		
DRY DENS: 204	<b>2</b> kg/m <sup>3</sup>	MOISTURE CONTENT:	10.6	%



Hole size after test:

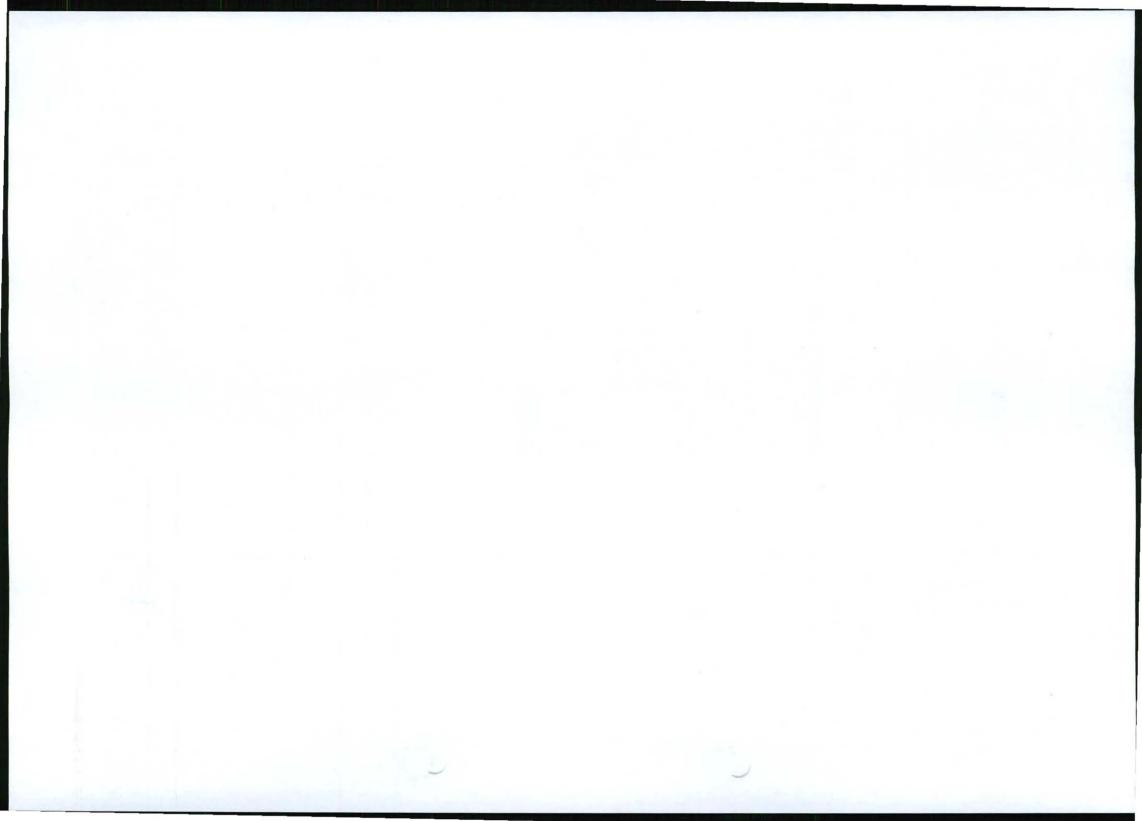
1 mm

### **Effluent Turbidity**

### **Dispersive Grade Classification**

50 Colour:	Clear	D1	Dispersive
mm Particles:	None	D 2	
180 Colour:	Clear	ND 4	Intermediate
mm Particles:	None	ND 3	
380 Colour:		ND 2	Non Dispersive
mm Particles:		ND 1	The state of the s

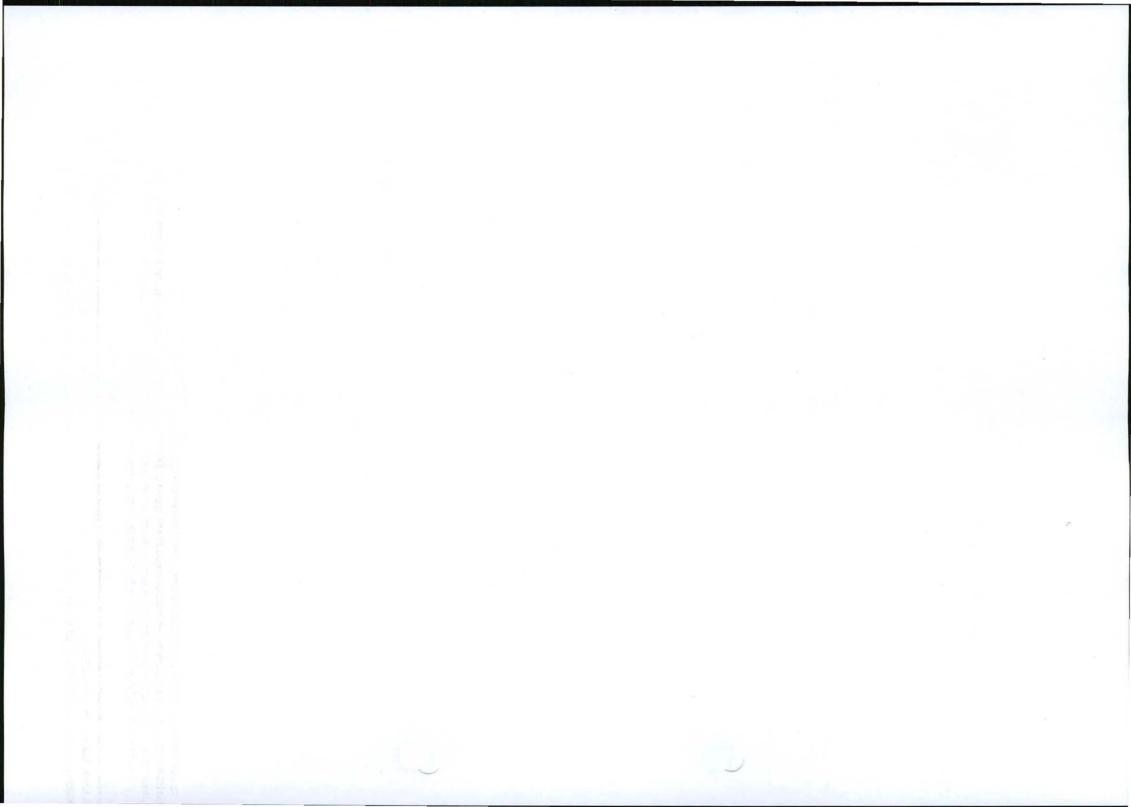
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Metago Environmental Engineers (Pty) Ltd

# APPENDIX D: STAGE CAPACITY CALCULATION FOR THE TSF

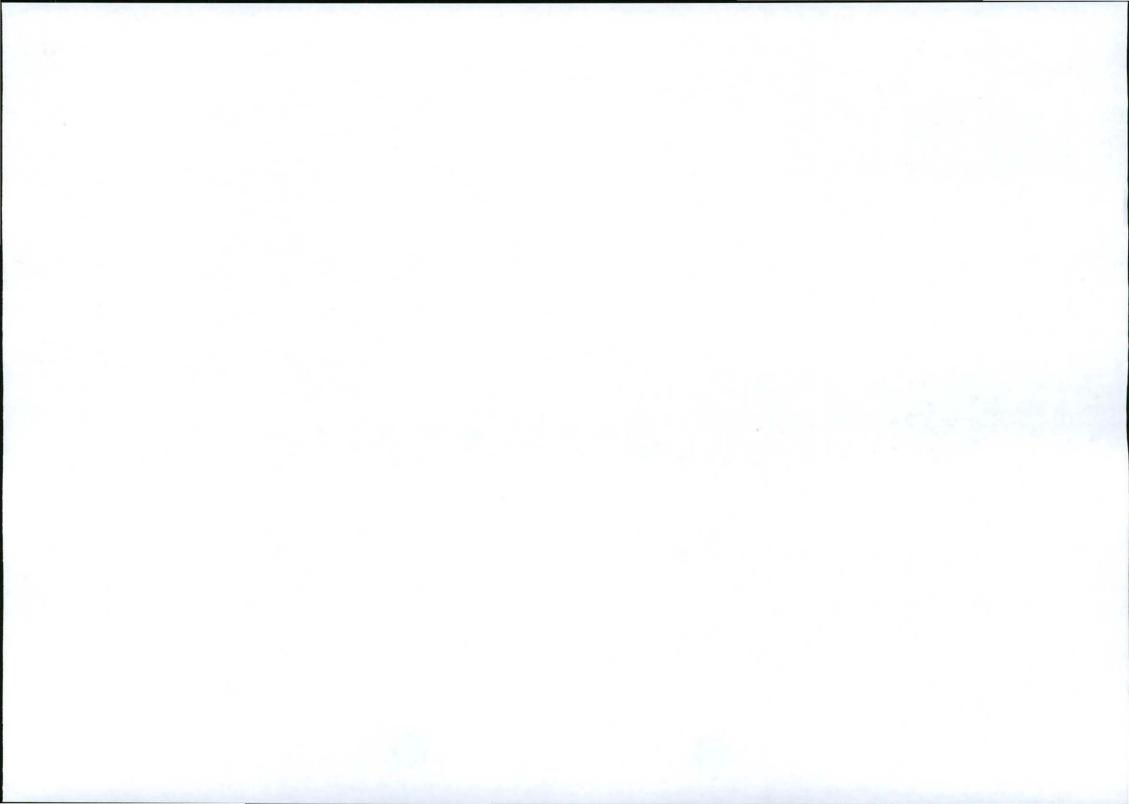
Metago stage capacity spreadsheet and curve as at May 2011.



Metago Environmental Engineers (Pty) Ltd

### APPENDIX E: SEEPAGE AND STABILITY ANALYSES

"Seepage and Stability Analysis of the Tailings Storage Facility for the Proposed Moonlight Iron Ore Project", Metago Environmental Engineers, Project No. T020-04, Report No. 2, May 2011.







# SEEPAGE AND STABILITY ANALYSIS OF THE TAILINGS STORAGE FACILITY FOR THE PROPOSED MOONLIGHT IRON ORE PROJECT

Prepared For

# Ferrum Crescent Limited

METAGO PROJECT NUMBER: T020-04

REPORT NO. 2

May 2011

# Seepage and Stability Analysis of the Tailings Storage Facility for the Proposed Moonlight Iron Ore Project

Prepared For

# **Ferrum Crescent Limited**

METAGO PROJECT NUMBER: T020-04

REPORT NO. 2

May 2011

# DOCUMENT INFORMATION

Title	Seepage and Stability Analysis of the Tailings Storage Facility for the Proposed Moonlight Iron Ore Project	
Project Manager	Stephen van Niekerk (PrEng)	
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Author	Malcolm Maber	
Reviewer	Stephen van Niekerk (PrEng)	
Client	Ferrum Crescent Limited	
Date last printed	09/06/2011 02:07:00 PM	
Date last saved	24/05/2011 09:51:00 AM	
Comments		
Keywords	Ferrum Crescent, Turquoise Moon, Moonlight Iron	
Project Number	T020-04	
Report Number	2	
Status	Final	
Issue Date	May 2011	

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# PRELIMINARY DESIGN OF THE TAILINGS STORAGE FACILITY FOR THE PROPOSED MOONLIGHT IRON ORE PROJECT

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# PRELIMINARY DESIGN OF THE TAILINGS STORAGE FACILITY FOR THE PROPOSED MOONLIGHT IRON ORE PROJECT

### 1 INTRODUCTION

Metago Environmental Engineers (Pty) Ltd (Metago) was requested by Turquoise Moon Trading 157 (Pty) Ltd (Turquoise Moon) on behalf of Ferrum Crescent Limited (Ferrum) to compile the tailings section of the EIA/EMP report for the proposed Moonlight Iron Ore project.

The proposed mining project will target the underground iron ore mineralisation areas by means of an open pit mine, and will involve the establishment of new infrastructure typically associated with an iron ore mine and ore processing plant, including a new tailings storage facility (TSF), return water facility and associated infrastructure.

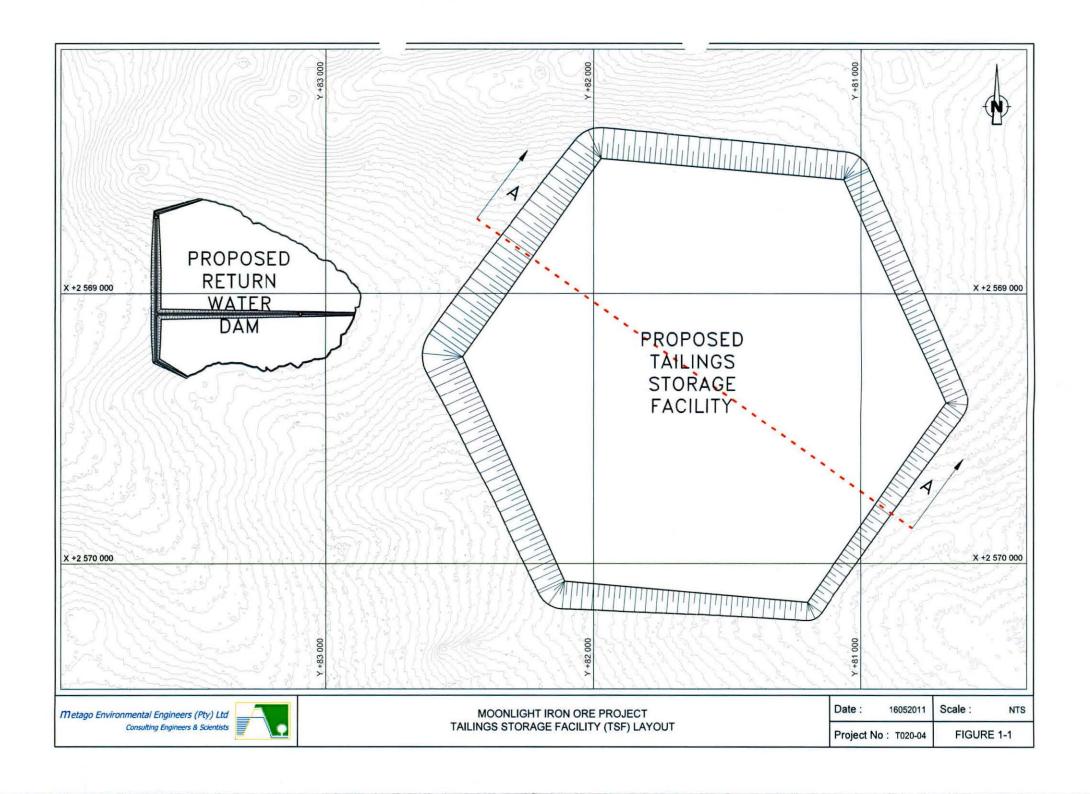
This report documents the findings from the seepage and slope stability analyses conducted for the preliminary design of the TSF for the proposed mining project. The plan view of the TSF is shown in Figure 1-1.

The seepage and stability analyses were carried out using the SEEP/W and SLOPE/W programmes respectively, and these are part of the GeoStudio 2007 suit of programmes.

### 1.1 SEEPAGE ANALYSES

The seepage analyses were conducted to estimate the likely seepage flux from the TSF into the underlying in-situ (foundation) materials and to assess the positioning of the under-drains to ensure that the phreatic surface is sufficiently drawn down from a stability perspective i.e. control the phreatic surface within the TSF and to prevent daylighting of the phreatic surface on the outer slopes of the TSF/starter walls.

The analyses were undertaken on a TSF cross section simulating the final design height i.e. final height to which the tailings will be placed. The period prior to this (commissioning and operational phase) and the period after decommissioning (draw down phase) have not been analysed.



Ten cases were analysed taking cognisance of:

- Top surface pool sizes, and
- The functionality of the under-drainage system (operational and non-operational).

The pool size has been estimated as a percentage of the available basin surface area. The pool sizes considered were 25%, 35%, 50%, 65% and 75%. The maximum seepage flux into the foundation material has been determined for each case. The pore-water pressure results, for selected pool sizes were used in the stability analysis.

#### 1.2 SLOPE STABILITY ANALYSES

The slope stability analyses were conducted to assess the performance of the selected side slope configuration of the TSF. During operations, tailings will be placed at an average side slope of 1V (vertical) to 4H (horizontal). The relatively flat side slope has been selected to ensure long term stability of the TSF (post closure) and to facilitate the ease of vegetation establishment during operations and at closure.

The stability analyses were undertaken considering pool sizes of 35% (considered to be the normal operating pool size) and 75% (worst case scenario). The functionality of the under-drainage system was also considered.

#### 1.3 TERMS OF REFERENCE AND SCOPE OF WORK

The terms of reference for the analyses were as follows:

- To estimate the likely seepage volume into the underlying (foundation) materials.
- To ensure that the proposed position of the under-drains is adequate to control the phreatic surface.
- Calculate the safety factor for the critical section under normal operating conditions and under realistic abnormal operations (e.g. large pond).

### 2 SEEPAGE ANALYSES

### 2.1 AVAILABLE INFORMATION AND REFERENCES

The following reports are relevant to this investigation and have been used as a source of information for this study:

- Metago Report T020-04, Report No. 1, Preliminary Design of the Tailings Storage Facility for the Proposed Moonlight Iron Ore Project, May 2011
- SEEP/W (2004), Stability Modeling with SEEP/W 2004- An Engineering Methodology, First Edition (User's Guide), Geo-Slope International Ltd., Calgary, Alberta, Canada.
- SEEP/W (2008), Seepage Modeling with SEEP/W 2007- An Engineering Methodology, Third Edition (User's Guide), Geo-Slope International Ltd., Calgary, Alberta, Canada.

#### 2.2 SEEP/W SOFTWARE SUMMARY

Seepage analyses were conducted using the finite element software SEEP/W 2007. This software is capable of analysing seepage through a two dimensional section using a finite element solution to the differential equation (Equation 1) that states that the sum of the rates of change of flows in the x- and y-directions plus the external applied flux is equal to the rate of change of the volumetric water content with respect to time. Under steady state conditions, the flux entering and leaving an elemental volume is the same at all times, reducing the right hand side of the equation to zero (Seep/W, 2008).

#### **EQUATION 1**

$$\frac{\partial}{\partial x} \left( K_x \cdot \frac{\partial H}{\partial x} \right) + \frac{\partial}{\partial y} \left( K_y \cdot \frac{\partial H}{\partial y} \right) + Q = \frac{\partial \Theta}{\partial t}$$

Where:

H is the total Head;

 $K_x$  is the permeability in the x- direction;

K<sub>v</sub> is the permeability in the y- direction;

Q is the applied boundary flux;

Θ is the volumetric water content; and

t is time.

This software allows for defining the geometry of the problem, and structured or unstructured meshing for generation of the suitable finite elements. Material properties and boundary conditions are user defined. Steady state and transient seepage analyses can be carried out.

SEEP/W presents the results visually or in tables for a number of parameters including equipotentials, flow vectors, the phreatic surface position and volumetric water content.

#### 2.3 GEOMETRY

The seepage analyses were carried out on the final design height (984.0 mamsl) TSF profile, cross-section A-A indicated in Figure 1-1 and shown in Figure 2-1. The TSF is a ring dyke impoundment with the natural underlying topography of the proposed site sloping towards the west. The TSF outer slope has been modelled at 1V:4H, the starter wall embankment slopes (inner and outer) were modelled at 1V:3H. The basin of the TSF has been modelled at a slope of 1V:500H. A toe drain (5m wide) is positioned at the inner toe of the starter wall and the toe of the TSF on the upstream flank. A blanket drain (10m wide) is positioned directly below the final crest of the TSF at Life of Mine. The simulated pools are positioned centrally on the top basin surface area.

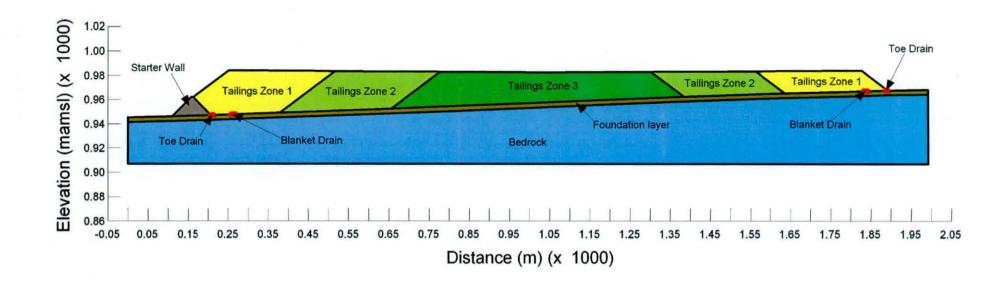
The operation and development of the TSF is expected to result in the material zones shown in Figure 2-1 (discussed further in Section 2.4 below). The analysis includes for a silty sand foundation layer underlain by bedrock. Since the model is a two dimensional model but the seepage takes place over the entire footprint (i.e. a three dimensional problem) the results from the two dimensional model are factored to estimate seepage from the entire TFS footprint using Equation 2 below.

#### **EQUATION 2 SHAPE FACTOR CALCULATION**

Shape Factor = 
$$\frac{Depositional\ Area}{Base\ area\ of\ CrossSection} = \frac{2736334\ m^2}{1782\ m^2} = 1536$$

Thus to estimate the total seepage from the entire footprint, the seepage flux through the base of the section analysed was multiplied by 1536.

FIGURE 2-1: TSF CROSS SECTION A-A



#### 2.4 MATERIAL PROPERTIES

A "saturated/unsaturated" SEEP/W material model was chosen for the analyses. This model requires the following inputs for each material type:

- · the hydraulic conductivity functions, and
- the hydraulic conductivity ratios (the ratio of the hydraulic conductivity in the y-coordinate direction to the hydraulic conductivity in the x-coordinate direction).

The three material zones shown in Figure 2-1 were introduced in the model to simulate the variation in material properties resulting from the anticipated gravitational segregation along the tailings beach, which is expected to occur during tailings deposition by spigotting

As a result of hydraulic deposition, the tailings particles tend to orientate themselves in such a way that the horizontal permeability is greater than the vertical permeability. In addition, as a result of beaching variations, coarse layers of material alternate with finer layers. These factors give rise to an effective higher horizontal permeability "K<sub>x</sub>" compared to the vertical permeability "K<sub>y</sub>". The outer Zone 1 exhibit high permeability and behave like fine sand or silty sand. From Zone 2 to Zone 3, tailings are progressively less permeable and exhibit fine silt or even clayey silt behaviour the closer it lies to the pool / penstock intake structure.

The hydraulic conductivity functions, conductivity ratios and geotechnical parameters for the tailings materials (respective zones) were assumed based on experience and published literature. The selected parameters are considered to be conservative and should however be confirmed in the detailed design phase of the project by laboratory testing on representative samples.

The foundation layer has been modelled as a silty sand (based on initial site observations) (3m thick) underlain by bedrock. It is assumed that the starter wall will be constructed from the in-situ foundation material sourced from the TSF basin i.e. similar geotechnical properties as that of the foundation layer but with decreased vertical permeability due to compaction of the material.

The material properties used in the models are summarised in Table 2-1. The material properties should be confirmed in the detailed design phase of the project by laboratory testing on representative samples.

**TABLE 2-1: SEEPAGE ANALYSIS MATERIAL PROPERTIES** 

Material		K <sub>x</sub> -Horizontal (m/s)	K <sub>v</sub> -Vertical (m/s)	K <sub>y</sub> /K <sub>x</sub>
	Zone 1 - High Permeability Tailings	2.0 x 10 <sup>-6</sup>	1.0 x 10 <sup>-7</sup>	1/20
Tailings	Zone 2 - Medium Permeability Tailings	5.0 x 10 <sup>-7</sup>	5.0 x 10 <sup>-8</sup>	1/10
	Zone 3 - Low Permeability Tailings	2.5 x 10 <sup>-8</sup>	5.0 x 10 <sup>-9</sup>	1/5
Civil Works	Starter Walls	1.0 x 10 <sup>-8</sup>	1.0 x 10 <sup>-9</sup>	1/10
	Insitu silty sand	5.0 x 10 <sup>-6</sup>	1.0 x 10 <sup>-6</sup>	1/5
Foundation	Bedrock	1.0 x 10 <sup>-7</sup>	1.0 x 10 <sup>-7</sup>	1

### 2.5 CASES ANALYSED

The ten different cases summarised in Table 2-2 were modelled to assess the positioning and efficiency of the under-drainage system to efficiently drawdown the phreatic surface in the outer zone of the TSF as well as estimating the seepage flux into the foundation layer for environmental purposes i.e. input into contaminant flow modelling. The main characteristics of these models are discussed below:

TABLE 2-2: SUMMARY DESCRIPTION OF SEEPAGE ANALYSIS - CASES MODELLED

Case	Pool Size	Toe and Blanket drai Non Operational	
1	25%		
2	25%	Operational	
3	35%	Non Operational	
4	35%	Operational	
5	50%	Non Operational	
6	50%	Operational	
7	65%	Non Operational	
8	65%	Operational	
9	75%	Non Operational	
10	75%	Operational	

#### 2.6 SEEPAGE ANALYSIS RESULTS

A full set of result figures for the seepage analyses is included in Appendix A. These figures show the position of the predicted phreatic surface (solid blue line) and seepage flux into the foundation layer (blue arrows along foundation layer and flow rate m³/sec per meter width). The unit seepage flux quantities obtained from the models are summarised in Table 2-3:

**TABLE 2-3: SEEPAGE UNIT FLUX VALUES** 

CASE	FOUNDATION (m <sup>3</sup> /s)	
1	5.93E-07	
2	6.39E-07	
3	1.00E-06	
4	1.11E-06	
5	1.64E-06	
6	2.03E-06	
7	2.07E-06	
8	3.24E-06	
9	2.55E-06	
10	6.33E-05	

### 2.7 DISCUSSION AND CONCLUSION

### 2.7.1 DRAIN POSITIONING

The results indicate that the 5m wide toe drain and 10m wide blanket drain (located directly below the final crest of the TSF at Life of Mine) should adequately control the phreatic surface along the outer perimeter of the TSF.

#### 2.7.2 PHREATIC SURFACE POSITION

Generally, under normal operating conditions with the under-drainage system operational, the phreatic surface is adequately drawn down. If the drainage system failed (i.e. non-operational under-drainage), and for pool sizes greater than 50%, the phreatic surface would daylight on the TSF slope at the top of the starter wall.

# 2.7.3 SEEPAGE FLUX TO GROUNDWATER

The likely range of long term seepage fluxes to the TSF foundation is summarised in Table 2-4 below.

TABLE 2-4: MAXIMUM SEEPAGE FLUX TO THE GROUND

CONDITION	TOTAL FOOTPRINT (m³/day)
35% Pool, Drainage system operational (Normal operating conditions) (Case 4)	148
75% Pool, Drainage system operational (Worst case scenario) (Case 10)	840

The pool size at the top must be kept as small as practical to reduce the seepage quantities to the ground.

### 3 SLOPE STABILITY ANALYSES

### 3.1 AVAILABLE INFORMATION AND REFERENCES

The following reports are relevant to this investigation and have been used as a source of information for this study:

- Metago Report T020-04, Report No. 1, Preliminary Design of the Tailings Storage Facility for the Proposed Moonlight Iron Ore Project, May 2011
- SLOPE/W (2008), Stability Modeling with SLOPE/W 2007- An Engineering Methodology,
   Third Edition (User's Guide), Geo-Slope International Ltd., Calgary, Alberta, Canada.

#### 3.2 SLOPE/W SOFTWARE SUMMARY

The slope stability analyses were done using slope stability software SLOPE/W 2007 from GEO-SLOPE. Using limit equilibrium, this software can model heterogeneous soil types, complex stratigraphic and slip surface geometry, and variable pore-water pressure conditions using a large selection of soil models. This software allows for both deterministic and probabilistic input parameters. Generally, in SLOPE/W the critical slip surface is first determined based on the mean value of the input parameters using a chosen factor of safety method (of analysis). Probabilistic analysis is then performed on the critical slip surface, taking into consideration the variability of the input parameters. For more information on the software algorithms, the reader is referred to the SLOPE/W online help facility and user manual.

#### 3.3 GEOMETRY AND MATERIAL PROPERTIES

### 3.3.1 GEOMETRY

The slope stability analyses were also carried out on the TSF profile section A-A described in Section 2.3.

### 3.3.2 MATERIALS PROPERTIES

The geotechnical parameters for the various materials have been estimated based on experience and published literature. The selected parameters used in the stability analyses are summarised in Table 3-1.

The material properties should be confirmed in the detailed design phase of the project by laboratory testing on representative samples.

TABLE 3-1: MATERIAL PROPERTIES INPUT FOR SLOPE/W

DESCRIPTION	BULK UNIT WEIGHT (KN/M3)	SATURATED UNIT WEIGHT (KN/M3)	APPARENT COHESION (C')	FRICTION ANGLE (DEGREES)
Tailings Zone 1	24.58	26.71	0	32
Tailings Zone 1	22.12	25.02	0	32
Tailings Zone 1	20.11	23.63	0	32
Starter Wall	20.04	21.02	0	32
Foundation layer	18.70	20.27	0	30
Bedrock	18.70	20.27	50	40

#### 3.4 METHOD OF ANALYSIS

#### 3.4.1 FACTOR OF SAFETY METHOD

The Morgenstern-Price factor of safety method was chosen for these analyses. This method ensures force equilibrium in both x- and y-directions, and moment equilibrium for the succession of slices into which the failure mass is divided.

### 3.4.2 SLIP SURFACE DETERMINATION

This analysis considered deep seated failure which is commonly used in industry to assess the stability of a TSF slope i.e. surface sloughing and local failure has not been considered as part of this study (but should be undertaken in the detailed design phase of the project). The slip surfaces were developed by defining entry/exit areas for the start and end points of the slip surfaces. The position of the critical slip surface with the lowest factor of safety was determined deterministically through a trial procedure. The critical slip surface was then further optimised to obtain the lowest possible factor of safety.

### 3.4.3 PORE-WATER PRESSURES

Finite element computed pore-water pressures were imported from the previous seepage analyses conducted for this TSF (Discussed in Section 2).

#### 3.4.4 CASES ANALYSED

Slope stability analyses were limited to the downstream slope (i.e. highest section) and were undertaken with simulated pool sizes of 35% and 75%, with both considering the functionality of the under-drainage system.

As stated above, the pore water pressure regime, including the position of the phreatic surface, has been imported from the seepage analysis. A pool size of 35% is considered to be adequate for normal operating conditions and 75% as a worst case scenario.

#### 3.5 SLOPE/W RESULTS

The results from the slope stability analyses are summarised in Table 3-2. The result figures showing analysed slip surfaces are included in Appendix B.

**TABLE 3-2: SLOPE STABILITY RESULTS** 

CASE	POOL SIZE	TOE AND BLANKET DRAIN	FACTOR OF SAFETY
3	35%	Non Operational	1.971
4	35%	Operational	2.128
9	75%	Non Operational	1.561
10	75%	Operational	2.125

#### 3.6 DISCUSSION AND CONCLUSION

The minimum factor of safety (FoS) is acceptable for all modelled cases as it is greater than the recommended 1.3. The minimum factor of safety of 1.3 is the industry accepted norm for TSF slopes – see Appendix C for general notes regarding TSF slope failures.

For the normal operating conditions (Case 4) – pool size, 35% and drains operational – the factor of safety is 2.128. For the worst case scenario (Case 10) – pool size, 75% and the drains operational – the factor of safety reduces to 2.125 i.e. the size of the pool does not significantly influence the factor of safety of the TSF, provided the drains are operational.

For the abnormal operating conditions (Case 3) – pool size, 35% and drains non-operational – the factor of safety reduces to 1.971. For the worst case scenario (Case 9) – pool size, 75% and the drains non-operational – the factor of safety significantly reduces to 1.561 i.e. the size of the pool does significantly influence the factor of safety of the TSF, in the event of the drains being non-operational.

Furthermore, the non-operation of the drains results in the phreatic surface daylighting on the slope of the TSF, that will significantly increase the likelihood of sloughing on the outer TSF slopes. Also the possibility of a piping failure of the TSF (i.e. internal erosion of tailings between the supernatant pool and the outer TSF slope) significantly increases.

## 4 RECOMMENDATIONS

#### 4.1 SEEPAGE

The following recommendations arise from the seepage study:

- The positioning of the under-drainage system is adequate for the control of the phreatic surface.
   The sizing of the drains (5m wide toe and 10m wide blanket drain) should be assessed in the detailed design phase to ensure that the outlet piping is adequately sized and that the selected drain widths are optimized.
- The permeability of the near surface foundation soils and tailings should be confirmed through laboratory testing and field infiltration tests during the detailed design and operational phase, since the tailings zones and material properties may differ significantly from the assumed values.
- Predicted seepage losses need to be confirmed once the infiltration testing is complete.
- Drain functionality should be monitored throughout the life of the TSF. Separation of the blanket drain and toe drain collection pipes is recommended to assist in diagnosis of a drain malfunction.
- Piezometric heads and drainage volumes must be monitored at least monthly to ensure safe operating phreatic surface conditions.
- During the detailed design phase, transient analysis should be carried out to assess the time it takes for the phreatic surface under normal conditions within the TSF to respond to abnormal conditions.

## 4.2 SLOPE STABILITY

The following recommendations are made with respect to the slope stability:

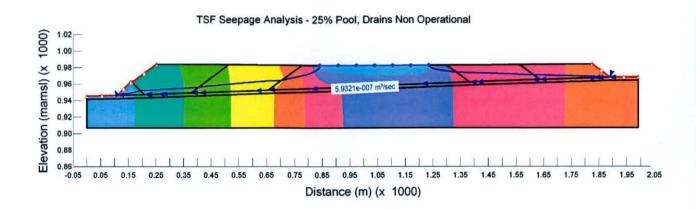
- The pond size should be minimised at all times through the provision of adequately sized off-dam water storage facilities, and ensuring proper functioning of drains and the decant system.
- The detailed design phase should undertake a probabilistic and sensitivity analysis to assess the impact of the variation of the material parameters.

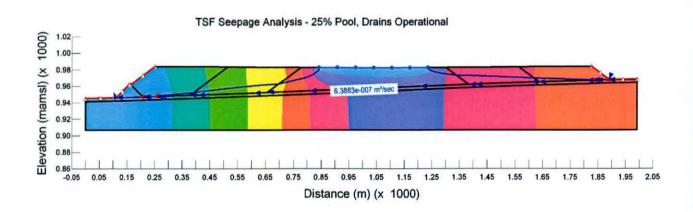
Malcolm Maber (Author)

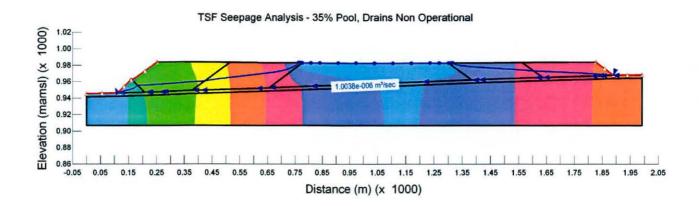
Stephen van Niekerk (Project Reviewer)

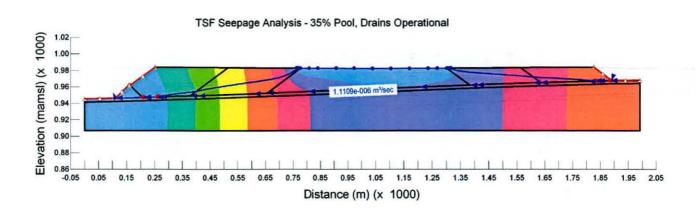
Metago Environmental Engineers (Pty) Ltd

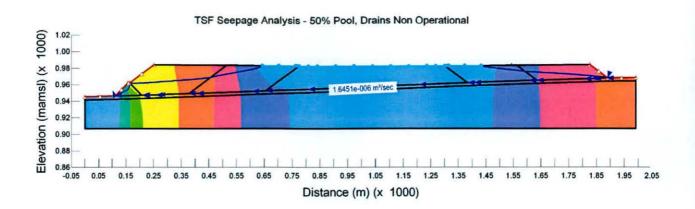
## APPENDIX A: SEEPAGE ANALYSIS OUTPUT SHEETS

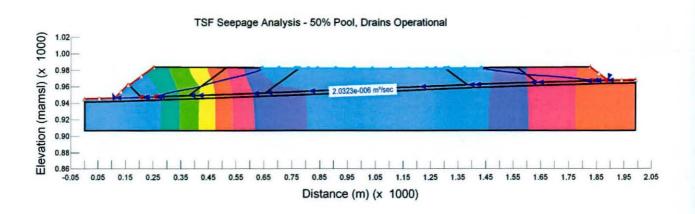


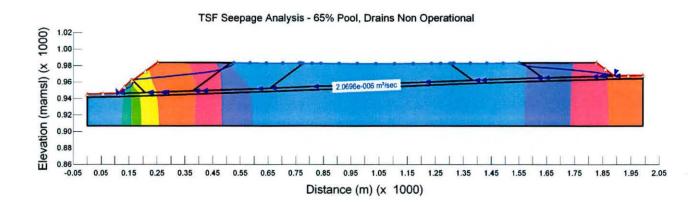


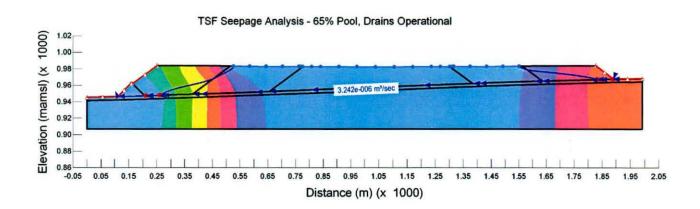


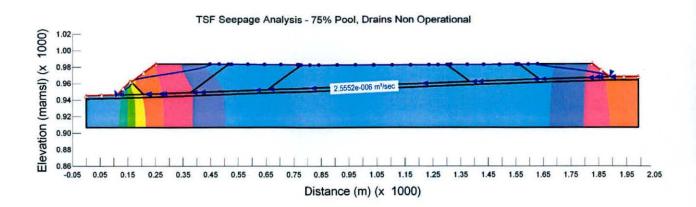


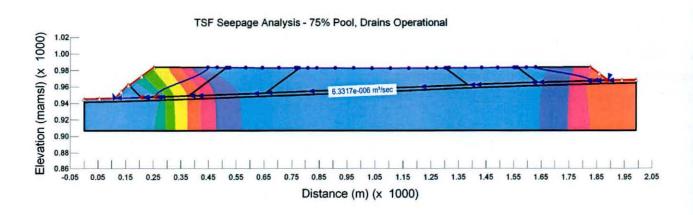






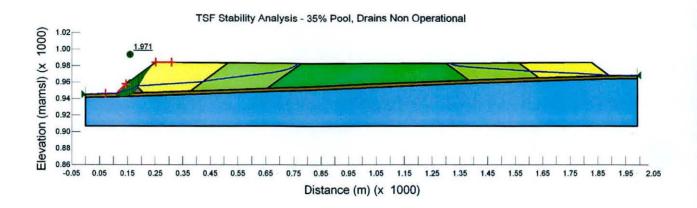




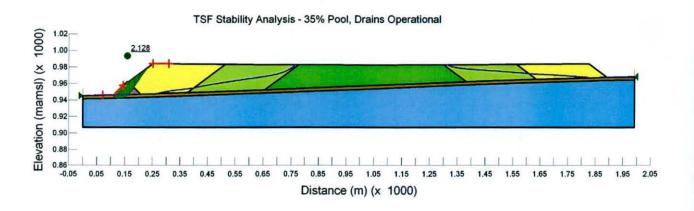


## APPENDIX B: SLOPE STABILITY ANALYSIS OUTPUT SHEETS

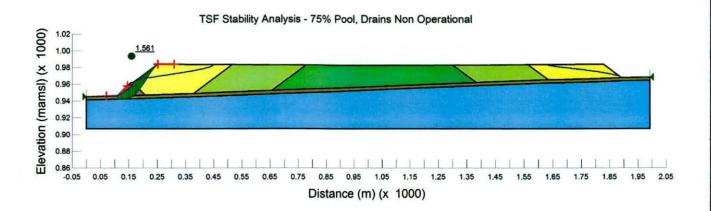
#### **STABILITY ANALYSIS - CASE 3**



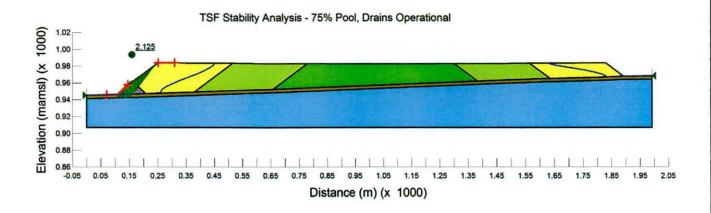
## STABILITY ANALYSIS - CASE 4



## STABILITY ANALYSIS - CASE 9



#### STABILITY ANALYSIS - CASE 10



**APPENDIX C: NOTES - TSF SLOPE FAILURES** 

## TSF Slope Failures

Generally, a TSF failure does not occur because of a single fault but rather a series of faults acting together, that ultimately result in either:

- · An overtopping of the embankment by the supernatant pond,
- · A classical slip circle or wedge type failure, or
- · A piping (internal erosion) failure between the supernatant pond and the outer slope of the TSF.

Any of the above faults can result in the liquefaction of a significant portion of the tailings material (i.e. tailings flow slide). The consequence of a tailings flow slide is often catastrophic as it affects a significant area downstream of the TSF.

The key variables that affect the stability of a TSF are:

- The location of the phreatic surface (i.e. increasing the pore water pressure along the failure surface reduces the effective shear strength along the failure surface and hence reduces the stability of the TSF).
- The strength of the materials through which a failure surface passes (e.g. reducing the effective friction angle and/or effective cohesion of a material along the failure surface reduces the stability of the TSF).
- The bulk density of materials above the failure surface (i.e. denser materials above the failure surface increase the failure moment and force equilibrium, and hence reduce the stability of the TSF. The bulk density of material increases as a function of the moisture content).

Stability analyses show that the distance from the pond edge to the embankment is a critical factor in determining the risk of failure. It is therefore recommended that water ponding close to the crest be avoided at all times, and careful water management at the TSF be undertaken.

The overtopping failure risk can be mitigated through the timeous construction of wall lifts. This in turn requires that the shear strength and trafficability of the material over which construction activities are to take place is sufficient to allow this activity. The TSF design is based on a maximum rate of rise of 1.0 m/yr which based on experience, is considered adequate to achieve acceptable shear strength for construction purposes in the area concerned.

A more comprehensive analysis of the modes of failure should be conducted during the detailed design phase including:

- Tailings liquefaction potential
- · Layering risk and mitigation
- Slope stability assessment taking cognisance of material variability

## Acceptable Factor of Safety

The Chamber of Mines Guidelines (1996) recommends the following for slope stability of TSF's:

- · The factor of safety should be greater than 1.3 for regularly monitored TSF's, and
- The factor of safety for an abandoned side slope e.g. TSF at closure, should be greater than 1.5.

The lower factor of safety (1.3) is accepted with the assumption that the TSF will be under continuous supervision, and that any signs of distress in the TSF will be noticed early on and any necessary remedial measures timeously undertaken.

## Probabilistic Slope Stability Analyses

With a probabilistic analysis, two useful indices are available to quantify the stability or the risk level of a slope. These two indices are known as the probability of failure and the reliability index.

The level of uncertainty associated with a slope is dependent on the level of uncertainty of a range
of parameters affecting the slope stability as mentioned above.

The factor of safety obtained using a deterministic approach fails to recognise the level of uncertainty associated with these parameters (especially at the preliminary stages of the design). There is no direct relationship between the deterministic factor of safety and probability of failure. A slope with a higher factor of safety may not necessary be more stable than a slope with a lower factor of safety. For example, a slope with factor of safety of 1.5 and standard deviation of 0.5 may have a much higher probability of failure than a slope with a factor of safety of 1.2 and standard deviation of 0.1. It is therefore suggested that the criteria for probability of failure should be applied in addition to a deterministic factor of safety approach.

The risk level, or probability of failure that can be tolerated, depends on the level of risk that stakeholders (including downstream property owners, authorities, the mine owner and consultants) are willing to accept. This may differ between the operational phase and post closure. The probability of failure is determined by counting the number of safety factors below 1.0 and then taking this number as a percentage of the total number of converged Monte Carlo trials.

Guidelines for the acceptable probability of failure for side slope failure documented in the literature (Cole, 1993) indicate that the probability of failure should not be higher than between 0.07% (1:1,430) and 0.007% (1:14,300) for short term and medium term (semi-permanent) slopes respectively. For long term slopes (i.e. at closure) the minimum acceptable probability of failure is considered to be 0.0007% (1:143,000). TSF side slopes can be considered to fall into Cole's definition of side slopes.

A criteria for using output distribution for assessing the consequences of slope failure also documented in the literature by Kok Shien, N, (2005) is shown in Table C-1. These criteria associate acceptable levels of probability of failure with various design conditions.

TABLE C-1: PROBABILITY OF FAILURE CRITERIA FOR SLOPE

CONDITIONS	CRITERIA FOR PROBABILITY OF FAILUR	
Temporary structures with low repair cost	0.1	
Existing large cut on interstate highway	0.01	
Acceptable in most cases EXCEPT if lives may be lost	0.001	
Acceptable for all slopes	0.0001	
Unnecessarily low	0.00001	

The reliability index describes the stability by the number of standard deviations separating the mean factor from its defined value of 1.0. Slopes with relative high reliability index will be expected to perform their function well. Slopes with low reliability index will be expected to perform poorly and present major rehabilitation problems. The target reliability values shown in Table C-2 are proposed by US Army (1999).

TABLE C-2: TARGET RELIABILITY INDICES (US ARMY, 1999)

EXPECTED LEVEL	PERFORMANCE	RELIABILITY INDEX	PROBABILITY OF UNSATISFACTORY PERFORMANCE
High	11	5	0.000003
Good		4	0.00003
Above averag	е	3	0.001
Below average	Э	2.5	0.006
Poor		2	0.023
Unsatisfactory		1.5	0.07
Hazardous		1	0.16

Note: Probability of unsatisfactory performance is the probability that the value of performance function will approach the limit state, or that an unsatisfactory event will occur. For example, if the performance function is defined in terms of slope instability, and the probability of unsatisfactory performed function is defined in terms of slope stability, and the probability of unsatisfactory performance is 0.023, then 23 of every 1000 instabilities will result in damage which causes a safety hazard.

In general, it is expected that the estimated factors of safety and probabilities of failure will improve once the TSF is decommissioned (i.e. post closure) as the phreatic surface dissipates and the tailings material further consolidates.

#### Sensitivity Study

A sensitivity analysis is equivalent to a probabilistic analysis. In SLOPE/W, this is performed by selecting parameters in an ordered fashion using a Uniform Probability Distribution function instead of a random selection process.



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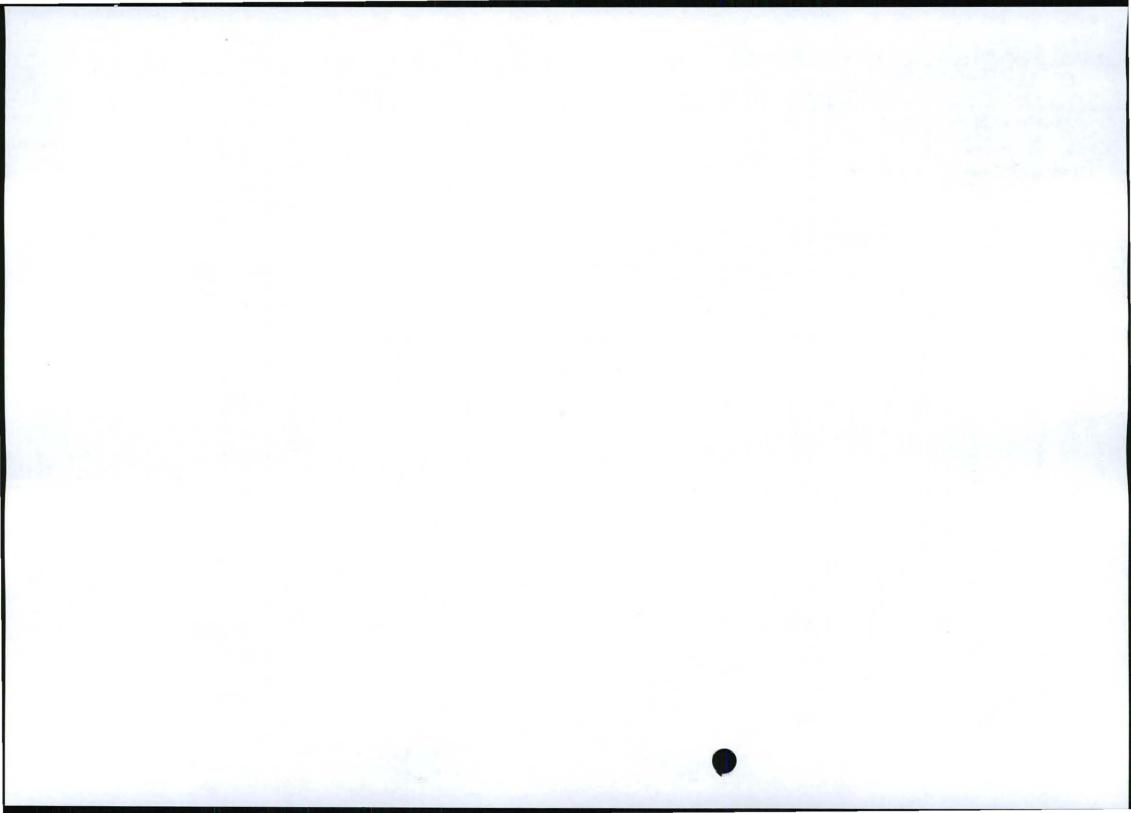
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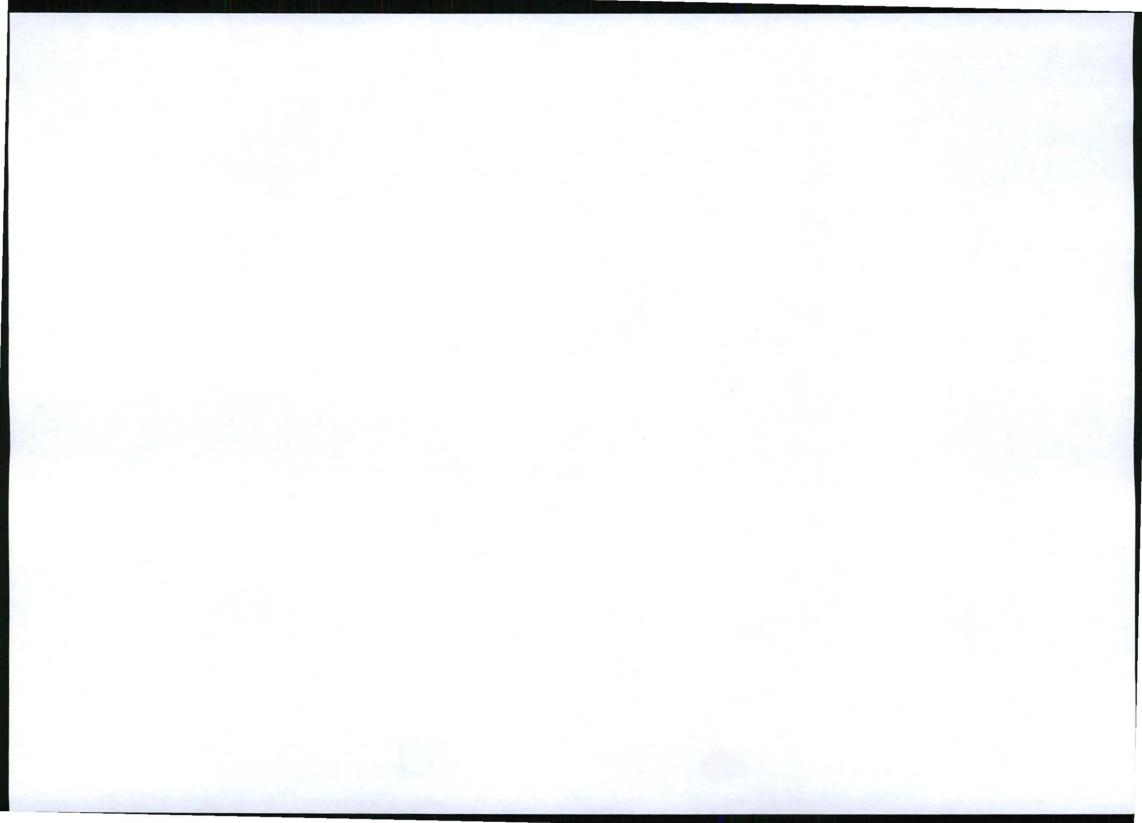
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## APPENDIX V: CLOSURE COST CALCULATION STUDY

Specialist report prepared by Metago, June 2011





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Project Reference: T020-02

22 June 2011

Proposed Moonlight Iron Ore Project

# CALCULATION OF THE FINANCIAL CLOSURE LIABILITY ASSOCIATED WITH PROPOSED MOONLIGHT IRON ORE MINE PROJECT

## 1. INTRODUCTION

This financial closure liability calculation is an initial estimate that has been prepared by Metago and submitted as part of the *Environmental Impact Assessment and Environmental Management Programme* for the proposed Moonlight Iron Ore Project, prepared for Turquoise Moon Trading 157 (Pty) Limited (Metago Project T020-02, Report No. 4, July 2011).

The calculations of the financial closure liability associated with the proposed Moonlight Iron Ore Project (Moonlight), as at December 2013 and at life of mine (plus 32 Years i.e. at December 2045)) 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 Department of Minerals and Energy (DME), dated January 2005.

The DME is now known as the Department of Mineral Resources (DMR).

## 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 financial liability associated with the proposed Moonlight Project.





## 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 byproducts (not trace elements) be identified.

The primary mineral at the proposed Moonlight Project is iron. There are no saleable mineral by-products from the mining or plant operations.

Mine/Process type	Iron Ore - Opencast
Saleable mineral by-product	N/A

## 2.2. STEP 2: RISK RANKING

According to the DMR guideline, the proposed Moonlight Project (due to its minerals mined (Iron Ore), tonnages (greater than 10,000 tonnes per month), processing plant and plant waste (tailings)) 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 – High risk (Large mine, greater than 10,000 tonnes per month) *
Revised risk ranking	N/A

<sup>\*</sup> Class A - High Risk = A high probability of occurrence of an impact with a severe consequence.

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

The proposed Moonlight Project is overall classified as having a High environmental sensitivity based on the classification criteria tabled overleaf:

- A medium to high biophyiscial sensitivity (based on the relatively pristine pre-mining environment of the project area).
- A medium social sensitivity (based on the proximity of the project area to local communities).
- A medium to high economic sensitivity (based on the project area's existing economic activity i.e. game farming, hunting and tourism).

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

Commissions	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>	The local communities are not within sighting distance of the mining operation, Lightly inhabited area (rural).	<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>	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 wellestablished 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	<ul> <li>Information available must include the following:</li> <li>An Approved EMP, or in the process of being approved,</li> <li>A detailed Closure Plan based on the EMP,</li> </ul>
	<ul> <li>A detailed breakdown of costs envisaged for rehabilitation and closure.</li> </ul>
Limited*	Information available is less comprehensive than that given above

<sup>\*</sup> Limited information available requires that DMR follow the 'rule-based' approach (see Step 4.3).

Since no detailed Closure Plan for the proposed Moonlight Project 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.

#### 2.5. STEP 4.2: CLOSURE COMPONENTS TO BE USED

The closure components relevant to the site-specific conditions are determined from the list provided below.

No.	Description of Closure Components*	Applicable
1	Dismantling of processing plant & related structures (incl. overland conveyors & power lines)	Yes
2 (A)	Demolition of steel buildings & structures	No
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)	Yes
13	Water management	Yes
14	2 to 3 years of maintenance & aftercare	Yes

The Closure Components selected are in-line with the decommissioning and closure objectives detailed in the *Environmental Impact Assessment and Environmental Management Programme* for the proposed Moonlight Iron Ore Project, prepared for Turquoise Moon Trading 157 (Pty) Limited (Metago Project T020-02, Report No. 4, July 2011).

It is important to note that Item 6 - Opencast rehabilitation (including final voids and ramps) does not allow for backfilling of the void, but only makes provision for the sloping of the pit walls to 1V:3H i.e. making the voids safe for humans and domestic animals.

Further details of the DMR closure components as provided by the DMR 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 2005 to December 2005, 3.4 %
- January 2006 to December 2006, 4.6 %
- January 2007 to December 2007, 7.2 %
- January 2008 to December 2008, 11.5 %
- January 2009 to December 2009, 7.1 %
- January 2010 to December 2010, 4.3 %
- January 2011 to April 2011, 3.93%

i.e. a total of 50.1 % since January 2005 (i.e. 1.034 x 1.046 x 1.072 ... etc.).

No.	No. Description		Master Rate (at June 2011)	Multiplication Factor *	
1	Dismantling of process plant & related structures (incl. overland conveyors & power lines)	m³	R 10.24	1.00	
2 (A)	Demolition of steel buildings & structures	m²	R 142.57	1.00	
2 (B)	Demolition of reinforced concrete buildings & structures	m²	R 210.11	1.00	
3	Rehabilitation of access roads	m²	R 25.51	1.00	
4 (A)	Demolition & rehabilitation of electrified railway lines	m	R 247.63	1.00	
4 (B)	Demolition & rehabilitation of non electrified railway lines	m	R 135.07	1.00	
5	Demolition of housing &/or administration facilities	m²	R 285.15	1.00	
6	Opencast rehabilitation including final voids & ramps		R 145,124.46	1.00	
7	Sealing of shafts, adits & inclines	На	R 76.54	1.00	
8 (A)	Rehabilitation of overburden & spoils		R 99,651.13	1.00	
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)		R 124,113.68	1.00	
8 (C)	C) Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)		R 360,484.95	1.00	
9	Rehabilitation of subsided areas	На	R 83,442.81	1.00	
10	General surface rehabilitation	Ha	R 78,940.50	1.00	
11	River diversions	На	R 78,940.50	1.00	
12	Fencing		R 90.05	1.00	
13	Water management		R 30,015.40	1.00	
14	2 to 3 years of maintenance & aftercare	На	R 10,505.39	1.00	

<sup>\*</sup> Multiplication factor based on Risk Ranking = Class A and Environmental Sensitivity = High.

## 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

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

## 2.8. STEP 4.5: AREAS OF DISTURBANCE

The proposed Moonlight project area of disturbance is shown in Appendix A.

The areas of disturbance for the proposed Moonlight Project consist of:

- Open pit,
- Waste rock dumps and topsoil stockpiles,
- Tailings storage facility,
- Ore processing plant,
- Mining complex,
- Construction administration and laydown area,
- Access and haul roads, and
- Powerlines, pipelines and other support infrastructure.

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

The increase in financial liability over the life of mine is largely due to continued mine operation/production that results in an ever increasing footprint for the open pit, waste dump and tailings storage facility (TSF) areas, and is summarised in the table overleaf.

		Oper	n Pit	Waste I	Dumps	TS	SF.	Increase
Date	Year	Increase in Area (A)	Total Area	Increase in Area (B)	Total Area	Increase in Area (C)	Total Area	in all Areas (A+B+C)
Construction	on Phase	•						
December 2013	1	n/a	0	n/a	0	n/a	0	0
December 2014	2	n/a	0	n/a	0	40.00	40.00 *	40.00
Operations	Phase							
December 2015	3	12.87	12.87	10.56	10.56	0.00	40.00 **	23.43
December 2016	4	25.74	38.61	10.56	31.68	40.75	80.75	77.05
December 2017	5	0.71	39.32	0.57	32.25	64.90	145.65	66.18
December 2018	6	0.76	40.08	0.64	32.89	41.34	186.99	42.74
December 2019	7	0.85	40.93	0.70	33.59	24.53	211.52	26.08
December 2020	8	95.73	136.66	78.52	112.11	22.57	234.09	196.82
December 2021	9	5.57	142.23	4.58	116.69	16.09	250.18	26.24
December 2022	10	34.15	176.38	28.02	144.71	0.24	250.42	62.41
December 2023	11	5.58	181.96	4.57	149.28	0	250.42	10.15
December 2024	12	16.73	198.69	13.72	163.00	0	250.42	30.45
December 2025	13	7.79	206.48	6.40	169.40	0	250.42	14.19
December 2045	33 (LOM)	79.35	285.83	65.10	234.5	0	250.42	144.45

#### 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)	

 <sup>\*</sup> In Year 2, TSF area allocated under closure component 10 - General surface rehabilitation.
 \*\* In Year 3, TSF area allocated under closure component 8 (B) - Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste).

#### 3. STEP 4.7: CALCULATE THE CLOSURE LIABILITY

The financial closure liability associated with the proposed Moonlight Project (as at December 2013 and at life of mine (plus 32 Years i.e. at December 2045) has been calculated to be R 7,516,457 (including VAT) and R 225,875,808 (including VAT) respectively. All amounts calculated are at Net Present Value (NPV) as at June 2011. The liability calculations are provided in Appendix B.

The financial closure liability associated with the proposed Moonlight Project for the first ten years of operation have also been calculated, and are summarised in the table below. The calculations are provided in Appendix B.

Date	Year	Financial Liability incurred during the year (incl. VAT)	Progressive Financial Liability (Incl. VAT)	Progressive Liability expressed as a % of LOM Liability
Construction	n Phase			
December 2013	1 *	R 7 516 457	R 7 516 457	3.3 %
December 2014	2	R 34 461 116	R 41 977 573	18.6 %
Operations F	Phase			
December 2015	3	R 20 874 819	R 62 852 392	27.8 %
December 2016	4	R 19 781 909	R 82,634,301	36.6 %
December 2017	5	R 14,920,738	R 97,555,039	43.2 %
December 2018	6	R 9,638,185	R 107,193,224	47.5 %
December 2019	7	R 5,889,224	R 113,082,448	50.1 %
December 2020	8	R 46,166,799	R 159,249,247	70.5 %
December 2021	9	R 6,014,666	R 165,263,913	73.2 %
December 2022	10	R 14,711,608	R 179,975,521	79.7 %
December 2023	11	R 2,392,111	R 182,367,632	80.7 %
December 2024	12	R 7,180,150	R 189,547,782	83.9 %
December 2025	13	R 3,346,732	R 192,894,514	85.4 %
December 2045	33 (LOM)	R 32,981,294	R 225,875,808	100.0 %

<sup>\*</sup> Assumes 30% of the pre-production construction work completed in Year 1.

The financial liabilities calculated, as per the DMR *Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine*, are considered to be Class 1 estimates (with an accuracy between +25% and -15%) based on the overall generic approach as stipulated by the DMR Guideline Document.

#### 4. CONCLUSION

The financial closure liability associated with the proposed Moonlight Project (as at December 2013 and at life of mine (plus 32 Years i.e. at December 2045) has been calculated to be R 7,516,457 (NPV including VAT) and R 225,875,808 (NPV including VAT) respectively, as per the *Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine* published by the Department of Mineral Resources (DMR).

The financial closure liability associated with the proposed Moonlight Project for the first ten years of operation have also been calculated, and are summarised in the table above.

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

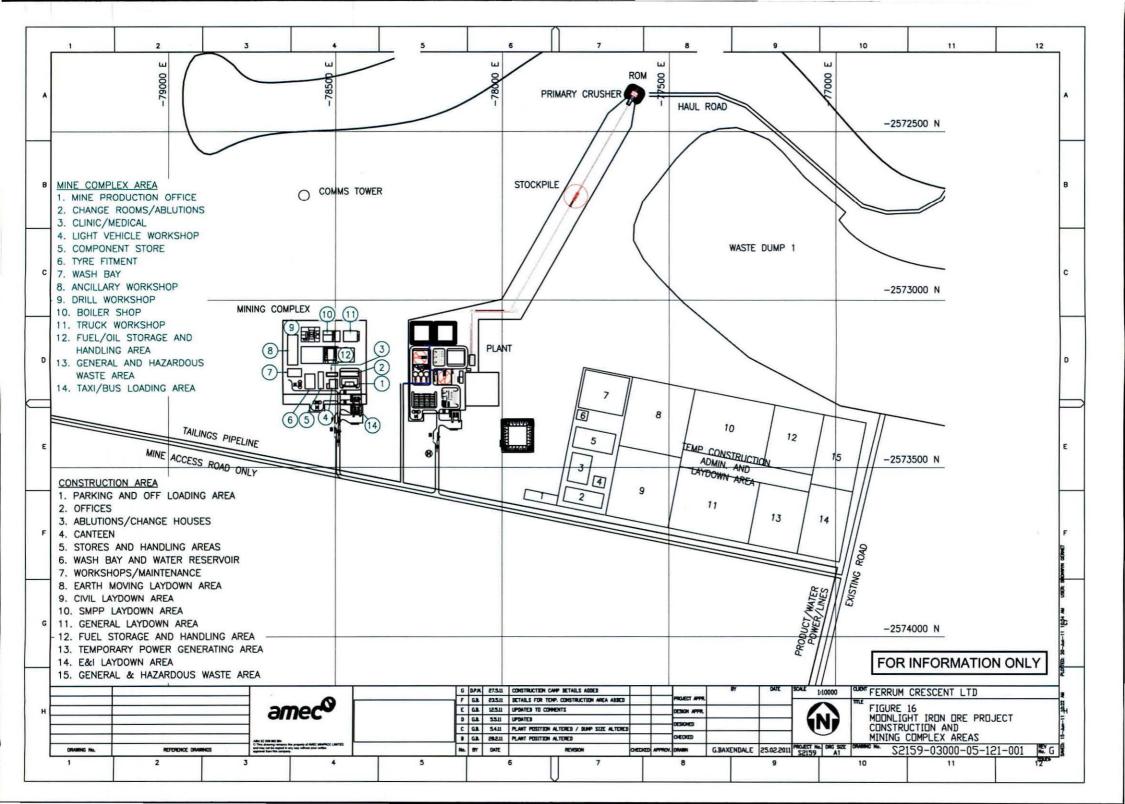
The financial liabilities only consider the routine costs associated with decommissioning of plant and infrastructure, the restoration of any environmental damage caused predominantly at the pre-production stage, the surface rehabilitation (shaping and vegetating) of waste deposits and material stockpiles,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

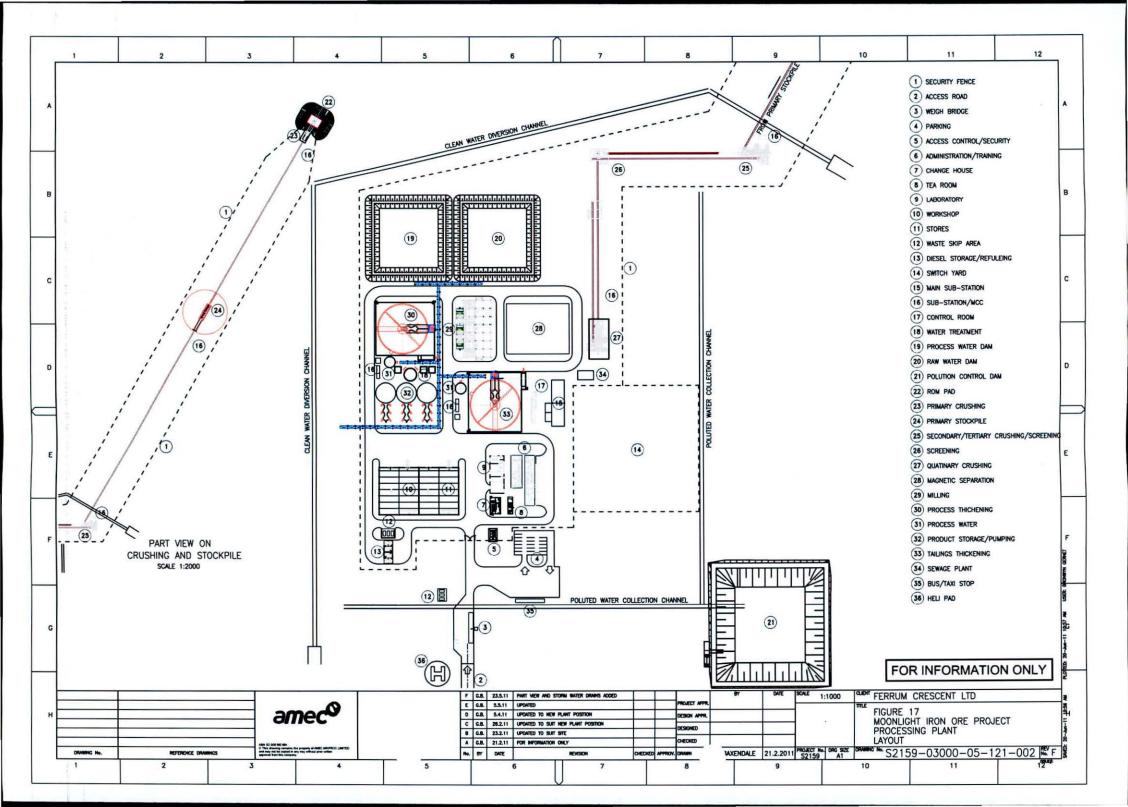
Site specific aspects such as surface and groundwater remediation have not been costed at this stage – the likelihood of such remediation would only be identified during the ongoing operation of the mine through surface and groundwater monitoring and/or by carrying out risk assessment and water pollution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

Stephen van Niekerk (Pr Eng)

For Metago Environmental Engineers (Pty) Ltd

APPENDIX A: Areas of Disturbance for the proposed Moonlight Project





APPENDIX B: Closure Liability Calculations for the proposed Moonlight Project

			CALCULATION OF TH	E QUANTUM				
Area	Turquoise Moon - Year 1		CALCULATION OF TH	E QUANTUM				
SAUTSKI			T T	Α Ι	В	c	D	E=A*B*C*D
No.	Description:	Unit:	Operational Area	Quantity	Master rate	Multiplication	Weighting	Amount
				Step 4.5	Step 4.3	factor Step 4.3	factor 1 Step 4.4	(Rands)
1	Dismantling of processing plant & related	m <sup>3</sup>	Secondary /Tertiary	24289.48	R 10.24	1	1	R 248 608.
	structures (incl. overland conveyors & power lines)		Crushing/Screening, Screening, Quatinary Crushing, Magnetic					
			Separation, Milling, Process Thickening, Tailings Thickening.					
			Process Water & Product Storage					
2 (A) 2 (B)	Demolition of steel buildings & structures  Demolition of reinforced concrete	m <sup>2</sup>	N/A Workshop & Stores	0.00 733.36	R 142.57	1	1	R 0.0
. (4.7)	buildings & structures	m <sup>2</sup>	Sewage Plant	28.52	R 210.11	1	1	R 5 992.
		m² m²	Tailings Thickening Process Thickening	385.05 385.05	R 210.11	1	1	R 80 903.
		m <sup>2</sup>	Product Storage/Pumping	260.75	R 210.11	1	1	R 54 785.
		m <sup>2</sup>	Water Treatment Milling	42.96 388.41	R 210.11	1	1	R 9 026.
		m² m²	Magnetic Separation	619.28	R 210.11	1	1	R 130 116.
		m <sup>2</sup>	Quatinary Separation Screening	190.13 47.53	R 210.11	1	1	R 9 948.
		m²	Secondary /Tertiary	57.04	R 210.11	1	1	R 11 984.
			Crushing/Screening Pollution Control Dam	33.95	R 210.11	1	1	R 7 133.6
		m² m²	Conveyor Belt Foundations	167.23	R 210.11	1	1	R 35 137.
		m <sup>2</sup>	Mining Complex	1 466.73	R 210.11	1	1	R 308 170.
3	Rehabilitation of access roads	m <sup>2</sup>	TSF Area Processing Plant Area	0.00 4 359.44	R 25.51	1	1	R 0.0
		m²	Haul Roads	0.00	R 25.51	1	1	R 0.0
4 (A)	Demolition & rehabilitation of electrified	m <sup>2</sup>	Mining Complex N/A	586.69 0.00	R 25.51 R 247.63	1	1	R 14 968.
10.50nE	railway lines			5,3%,0~	III. MAN CANALA			707,984
4 (B)	Demolition & rehabilitation of non electrified railway lines	m	N/A	0.00	R 135.07	1	1	R 0.
5	Demolition of housing &/or administration facilities	m <sup>2</sup>	Access Control & Security	23.77	R 285.15	1	1	R 6 776.
	racings.	m <sup>2</sup>	Administration Change House	168.40 35.31	R 285.15 R 285.15	1	1	R 48 019.
		m <sup>2</sup>	Tea Room	17.66	R 285.15	1	1	R 5 034.
		m² m²	Laboratory Control Room	61.11 32.59	R 285.15	1	1	R 17 426.
		m <sup>2</sup>	Mining Complex	586.69	R 285.15	1	1	R 167 292.
6	Opencast rehabilitation including final voids & ramps	ha	Opencast Pit	0.00	R 145 124,46	1	1	R 0.0
7	Sealing of shafts, adits & inclines	m <sup>3</sup>	N/A	0.00	R 76.54	1	1	R 0.0
8 (A)	Rehabilitation of overburden & spoils	ha	Waste Dump 1 Waste Dump 2	0.00	R 99 651.13 R 99 651.13	1	1	R 0.0
8 (B)	Rehabilitation of processing waste	ha	SWD & RWD	0.00	R 124 113.68	1	1	R 0.0
	deposits & evaporation ponds (basic, salt producing waste)	ha ha	TSF - Basin TSF - Side Slopes	0.00	R 124 113.68 R 0.00	1	1	R 0.0
		ha	Process Water Dam	0.15	R 124 113.68	1	1	R 18 541.2
		ha	Raw Water Dam	0.15	R 124 113.68	1	1	R 18 541.2
8 (C)	Rehabilitation of processing waste	ha ha	Pollution Control Dam N/A	0.23664	R 124 113.68 R 360 484.95	1	1	R 29 370.2
3	deposits & evaporation ponds (acidic.							
9	metal-rich waste) Rehabilitation of subsided areas	ha	N/A	0.00	R 83 442.81	1	1	R 0.0
10	General surface rehabilitation	ha	Surrounding Areas of TSF	0.00	R 0.00	1	1	R 0.0
		ha ha	Topsoil Stockpiles Mining Complex	0.00 1.96	R 78 940.50 R 78 940.50	1	1	R 0.0
		ha	Construction Admin & Laydown	30.78	R 78 940.50	1	1	R 2 430 038.0
		ha	Concrete Areas	0.00	R 78 940.50	1	1	R 0.0
		ha ha	Additional Concrete Areas Access Roads	0.04	R 78 940.50 R 78 940.50	1	1	R 3 110.8
11	River diversions (to be decommissioned)	ha	N/A	0.00	R 78 940.50	1	1	R 0.0
12	Fencing Water management	m ha	Processing Plant Area Pollution Control Dam	915.41 0.24	R 90.05 R 30 015.40	1	1	R 82 429.1
		ha	Open Cast Voids & Ramps	0.00	R 30 015.40	1	1	R 0.0
14	2 to 3 years of maintenance & aftercare	ha	Operational TSF, Surrounding Areas & Concrete Areas	0.00	R 10 505.39	1	1	R 0.
		ha	Reinforced Concrete Buildings	0.23	R 10 505.39	1	1	R 2 422.
		ha ha	Administration Overburden & Spoils	0.09	R 10 505.39 R 10 505.39	1	1	R 972.
		ha	Evaporation Ponds	0.54	R 10 505.39	1	1	R 5 624.
		ha	Processing Plant Area	0.26	R 10 505.39	1	1	R 2 779.
5 (A)	Specialist study (Water pollution potential	ha SUM	General Surface Rehabilitation All Areas	33.27 0.00	R 10 505.39	1	1	R 349 543.1
	study)				20110253011010			
5 (B)	Specialist study (Overall quantified risk assessment)	SUM	All Areas	0.00	R 300 000.00	1	1	R 0.0
5 (C)	Concrete Slabs & Light Structures	m²	Silt Trap	0.00	R 130.00	1	1	R 0.0
		m <sup>2</sup>	Energy Dissipator Solution Trench	0.00	R 130.00	1	1	R 0.0
		m <sup>2</sup>	Helicopter Pad	106.65	R 130.00	1	1	R 13 864.5
		m <sup>2</sup>	Waste Skip Area Weigh Bridge	43.46 31.24	R 130.00	1	1	R 5 649.0
		m <sup>2</sup>	Diesel Storage/Refueling	46.45	R 130.00	1	1	R 6 038.0
		m² m²	Main Substation Sub-Station/MCC	134.45 31.84	R 130.00	1	1	R 17 478.5
		m.	and onnounced	31.04	11 130.00		Sub Total 1	R 4 843 623.8
-						(Sum of items	to 15 Above)	
1	Preliminary and general		12.5% of Subtota	al 1		Weighting factor 2	1.05	R 635 725.6
2	Administration & supervision costs			6.0% of Subtota	ii 1	(step 4.4)		R 290 617.4
3	Engineering drawings & specifications Engineering & procurement of specialist			2.0% of Subtota 2.5% of Subtota	d 1			R 96 872.4 R 121 090.6
	work			PROPERTY OF LINE				741,745,47634,400
5	Development of a closure plan Final groundwater modeling			2.5% of Subtota	1.1			R 121 090.6
	Manager of the second s		1014	ubtotal 1 alice are	of management	2 administrative to	Sub Total 2	R 6 109 020.5
			(S			& administrative items,	i to 6 above)	
7	Contingency			10.0% of Subtot	al 1		Sub Total 3	R 484 362.3 R 6 593 382.5
						(Subtotal 2 plus		n 0 393 362.5
_	VAT			14.0% of Subtot	al 3			R 923 073.6
8				THE PERSON WITH THE PERSON WIT				

Escalation Factor 1.50077

5.13%

0.00% 3.18% 0.12% 1.67% 1.67% 1.13% 0.19% 1.68% 2.69% 0.82% 0.21% 0.25%

0.15% 0.73% 6.36% 0.00% 2.30% 0.00% 0.31% 0.00%

0.00%

0.14% 0.99% 0.21% 0.10% 0.36% 0.19% 3.45% 0.00%

0.00% 0.00% 0.00% 0.00% 0.00% 0.38% 0.38% 0.61%

0.00% 0.00% 0.00% 3.19% 50.17% 0.00% 0.81% 0.00% 1.70% 0.15% 0.00%

0.05% 0.02% 0.00% 0.12% 0.06% 7.22% 0.00%

0.00%

0.00% 0.00% 0.00% 0.29% 0.12% 0.08% 0.12% 0.36% 0.09% 100.00%

Template for "rules-based" approach of the quantum for financial provision	CALCULATION OF THE QUANTUM	

Proceedings of sections part with with a control part of sections and sections of sections and sections are sections as a section of sections and sections are sections as a section of sections and sections are sections as a section of section and sections are sections as a section of section and sections are sections as a section and section and sections are sections as a section and s	Columnication   Columnicatio	Dismantling of processing plant & related structures (incl. overland conveyors & power lines)		Operational Area	Quantity	Master rate	Multiplication	Weighting	Amount
Processing of contents of co	Processing of contents of co	Dismantling of processing plant & related structures (incl. overland conveyors & power lines)			in man		factor	factor 1	(Rands)
m	m			Secondary / Tertiary Crushing/Screening. Crushing/Screening. Adamseric Separation. Milling. Process Thickening. Tallings Thickening.	90470.13	Step 4.3 R 10.24	Step 4.3	Step 4.4	R 925 984.49
March   Marc	March   Marc	molition of steel build		N/A	0.00	R 142.57		1	R 0.00
The control of the	The control of the	E B	m <sub>2</sub>	Workshop & Stores Sewage Plant	2 444.55				R 19 974.11
Maintenance   1882   87   87   11   11   11   11   11   11	Maintenance   1882   87   87   11   11   11   11   11   11		m <sup>2</sup>	Tailings Thickening	1 283.52			+	R 269 676.72
Marie Company Security   159-15   R 2011   1   1   1   1   1   1   1   1   1	Marie Company Security   159-15   R 2011   1   1   1   1   1   1   1   1   1		E	Process Inckening	1 283.52			-	H 269 6/6.72
Many Control Science   March   Many Control Science   March   Many Control Science   March   Many Control Science   March	Many Control Science   March   Many Control Science   March   Many Control Science   March   Many Control Science   March		2,6	Water Treatment	143.21		-	-	R 30 089.33
The Controlled Scientific Scien	The Controlled Scientific Scien		m <sup>2</sup>	Milling	1 294.70			1	R 272 027.20
The Control School Sc	The Control School Sc		E	Magnetic Separation	2 064.28				H 433 721.75
The control of the	The control of the		1	Screening Separation	158.44			-	R 33 290.11
The control Design	The control Design		1	Secondary /Tertiary	190.13		-	-	R 39 948.01
Mining Complete Bell Evolutions   15 286 37   R 20 11   1   1   1   1   1   1   1   1   1	Mining Complete Bell Evolutions   15 286 37   R 20 11   1   1   1   1   1   1   1   1   1			Pollution Control Dam	113.17		-	-	R 23 778.74
Tile Area   Tile	Tile Area   Tile		Ш	Conveyor Belt Foundations	557,45	П	1	1	R 117 123.96
The control of the	The control of the			Mining Complex	16.296.97			1	R 3 424 119.88
MACONSTITUTE   MACO	MACONSTITUTE   MACO	Rehabilitation of access roads		TSF Area	49 855.03				R 1 271 955.10
Mining Complex   6 5 18, 25   7 1 1 1 1 1	Mining Complex   6 5 18, 25   7 1 1 1 1 1			Haul Roads	19 148.94			-	R 488 548.53
1	1	Domoffice & schoolifferies of pleasified		Mining Complex	6.518.79			-	R 166 314 39
NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	railway lines		WA	0.00				H 0.00
m	m	Demolition & rehabilitation of non	E	NA	00.00	R 135.07	•	•	R 0.00
Main	Main	Demolition of housing 8/or administration	П	Access Control & Security	79.22	R 285.15	-	1	R 22 589.29
The Recommendation	The Recommendation	facilities		Administration Chapse House	561.34	- 1	-		R 160 064.02
Abouting Complex   C 518 79 R 282515   1   1   1   1   1	Abouting Complex   C 518 79 R 282515   1   1   1   1   1			Tea Room	58.85			-	R 16 780.86
The control of the	The control of the			Laboratory	203.71			-	R 58 087.72
Name	Name			Mining Complex	6518.79	- 1		-	R 1 858 807.94
NA	NA	Opencast rehabilitation including final		Opencast Pit	0.00			-	R 0.00
Misse Damp 1	Misse Damp 1	voids & ramps Sealing of chafte adits & inclines		2	000	- 1			0000
1	1	Rehabilitation of overburden & spoils		Waste Dump 1	00.0	R 99 651.13		जा जा	R 0.00
Page 1960   Page	Page 1960   Page			Waste Dump 2	0.00	R 99 651,13	-	-	R 0.00
NA	NA	-		SWD & RWD	0.00	R 124 113.68		-	R 0.00
NA	NA	o C	- 1	ISF - Basin Process Water Dam	0.00	H 124 113.68		-	H 0.00
Na   Pollution Control Dam   0.00   R 350 444 56   1   1	Na   Pollution Control Dam   0.00   R 350 444 56   1   1			Raw Water Dam	00:00		-	-	R 0.00
NA   NA   NA     NA   NA   NA     NA   NA	NA   NA   NA     NA   NA   NA     NA   NA		ш	Pollution Control Dam	0			1	R 0.00
Name	Name	Rehabilitation of processing waste deposits & evaporation ponds (acidic		NA	00.00			-	R 0.00
Page 175 Area   118.29   R3 44.28   1   1   1   1   1   1   1   1   1	Page 175 Area   118.29   R3 44.28   1   1   1   1   1   1   1   1   1	metal-rich waste)							
Name	Name	Rehabilitation of subsided areas	ha	N/A	00.00			-	R 0.00
The Construction Admin & Laydown   30,136   R 18 464556   1   1   1   1   1   1   1   1   1	The Construction Admin & Laydown   30,136   R 18 464556   1   1   1   1   1   1   1   1   1	General surface renabilitation	- 1	Topsoil Stockniles	118.39	- 1			R 3 810 206 78
Page   Concentration   Page   Page	Page   Concentration   Page   Page		1 1	Mining Complex	6.52	ш		-	R 514 596.30
Pai	Pai		- 1	Construction Admin & Laydown	30.78			ī	R 2 430 038.09
This Access Reads	This Access Reads		- 1	Concrete Areas	2.61	- 1			R 205 753.68
The continue of the continue	The continue of the continue		- 1	Access Roads	10.0			-	R 710 892 30
The continuent of the contin	The continuent of the contin	River diversions (to be decommissioned)	ha	N/A	0.00			-	R 0.00
Parameter   Para	Parameter   Para	Fencing	Ε	Processing Plant Area	3 051.37	ш		1	R 274 764.61
The control of maintenance & aftercase	The control of maintenance & aftercase	Water management	ha	Pollution Control Dam	67.0			-	R 23 676.15
Page   Concrete Buildings   191   R10 505.39   1   1   1   1   1   1   1   1   1	Page   Concrete Buildings   191   R10 505.39   1   1   1   1   1   1   1   1   1	of maintenance &	ha	Open Cast Voids & Hamps TSF, Surrounding Areas &	194.26			-	R 2 040 743.28
The Administration of the Properties Spoils   The Administration of the Properties Spoils   The Administration of the Properties Spoils   The Administration of the Properties Perhabilitation   The Administration   The Administration   The Properties Perhabilitation   The Administration   The Administ	The Administration of the Properties Spoils   The Administration of the Properties Spoils   The Administration of the Properties Spoils   The Administration of the Properties Perhabilitation   The Administration   The Administration   The Properties Perhabilitation   The Administration   The Administ			Concrete Areas		- 1			2
The continues of the	The continues of the		ha h	Meinforced Concrete Buildings	1.97			-	H 20 057.90
Page   Evaporation Ponds   Page   P	Page   Evaporation Ponds   Page   P		ha	Overburden & Spoils	0.00	1		-	R 0.00
Page	Page		ha	Evaporation Ponds	00:00	ш		1	R 0.00
According to the continue of	According to the continue of		ha	Processing Plant Area	0.85		-	-	R 8 908.40
All Areas	All Areas	Concinies et udu (Motor collution potential	CHA	General Sunace Renabilitation	0.000				H 2 255 033,44
All Areas	All Areas	specialist study (water political potential study)	SON	All Aleas	0.0	200,000,000			0.00
The continues	The continues	Specialist study (Overall quantified risk	SUM	All Areas	0.00	R 300 000.00		1	R 0.00
The control of the	The control of the	S	a <sub>s</sub>	Silt Trap	1 153.20			1	R 149 916.00
The control of the	The control of the			Energy Dissipator	108.00			-	R 14 040.00
Main Substantion   1	Main Substantion   1			Solution Trench	24 803.20				H 3 224 416.00
The contingency   The contin	The contingency   The contin			Waste Skip Area	144.86			-	R 18 832.06
m²   Mains Bussalion   15.5% of Subtotal   148.17   1730.00   1   1   1   1   1   1   1   1   1	m²   Mains Bussalion   15.5% of Subtotal   148.17   1730.00   1   1   1   1   1   1   1   1   1		ш	Weigh Bridge	104.12			1	R 13 535.60
Total   Sub-Station   Sub-Station   Total   Sub-Station   Total   Sub-Station   Total	Total   Sub-Station   Sub-Station   Total   Sub-Station   Total   Sub-Station   Total			Diesel Storage/Refueling	154.82				R 20 126.73
Sum of items 1 to 15 Above)   12.5% of Subtotal 1   Weighting factor 2   1.05	Sum of items 1 to 15 Above)   12.5% of Subtotal 1   Weighting factor 2   1.05			Sub-Station/MCC	106.12				R 13 795.60
12.5% of Subtotal 1	12.5% of Subtotal 1		1					Sub Total 1	R 27 050 455.23
12.5% of Subtotal 1   Weighting factor 2   1.05	12.5% of Subtotal 1   Weighting factor 2   1.05						(Sum of items	1 to 15 Above)	
Supervision costs   6.0% of Subtotal 1   Istep 4.4	Supervision costs   6.0% of Subtotal 1   Istep 4.4	Preliminary and general		12.5% of Subtot	al 1		Weighting factor 2		R 3 550 372.25
drawings & specifications   2.0% of Subtotal 1	drawings & specifications   2.0% of Subtotal 1	Administration & supervision costs			6.0% of Subtot		(step 4.4)		R 1 623 027,31
A procurement of specialist  2.5% of Subtotal 1  2.6% of Subtotal 1  2.6% of Subtotal 1  3.6% of Subtotal 3  (Subtotal 2 plus contingency)  10.0% of Subtotal 3	A procurement of specialist  2.5% of Subtotal 1  2.6% of Subtotal 1  2.6% of Subtotal 1  3.6% of Subtotal 3  (Subtotal 2 plus contingency)  10.0% of Subtotal 3	Engineering drawings & specifications			2.0% of Subject	111			R 541 009.10
1 to fa a closure plan  2. 5% of Subtotal 1  Sub Total 2  (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  Sub Total 3  (Subtotal 2 plus contingency)	1 to fa a closure plan  2. 5% of Subtotal 1  Sub Total 2  (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  Sub Total 3  (Subtotal 2 plus contingency)	work			00000				020000
Sub Total 2 (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10,0% of Subtotal 1  Sub Total 3 (Subtotal 2 plus contingency)	Sub Total 2 (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10,0% of Subtotal 1  Sub Total 3 (Subtotal 2 plus contingency)	Development of a closure plan			2.5% of Subtat	11			R 676 261.38
(Subtotal 2 (Subtotal 3 (Subtotal 3 )	(Subtotal 2 (Subtotal 3 (Subtotal 3 )			37			1	Sub Total 2	R 34 117 386.65
10,0% of Subtorial 1 Sub Total 3 (Subtorial 2 plus contingency) 14,0% of Subtorial 3	10,0% of Subtorial 1 Sub Total 3 (Subtorial 2 plus contingency) 14,0% of Subtorial 3			9)	subtotal 1 pius sum	manageme	<b>E</b>	s, 1 to 6 above)	
(Subtotal 2 plus contingency)	(Subtotal 2 plus contingency)	Contingency			10.0% of Subtol	al 1		Sub Total 3	R 2 705 045.52 R 36 822 432.18
14.0% of Subtotal 3	14.0% of Subtotal 3						(Subtotal 2 pli	us contingency)	
O MINIOPO TO OLOTTI	O MINIOPO TO OLOTTI	IVAT			14 0% of Subto	9 3			R 5 155 140 50
					14.0 % OI SUBIO	di 3			00.041.00
L	GRAND TOTAL B 41 977 578 6								The same of the sa

1.00% 0.00% 0.11% 0.11% 0.11% 0.11% 0.11% 0.00%

Sub Total 1 1 10 15 Above)  Sub Total 2 1 10 6 above)	R 78 940.50 R 78 940.50 R 90.05 R 30.015.40 R 10.505.39 R 10.505.39	12.87 192.48 192.48 1.91 0.75 10.56 10.56 10.56 10.4.71 0.00 F 0.00 F 0.			Conlingency	
\$ub Total 1 1 10 5 Mb Total 2 1 10 6 sbove)	R 78,940,50 R 78,940,50 R 78,940,50 R 30,015,40 R 30,015,40 R 30,015,40 R 10,505,39 R 10,5	192.48 192.48 1.93 1.93 1.93 1.93 1.93 1.93 1.93 1.93				3
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	R 78,940,50 R 78,940,50 R 90,015,40 R 90,015,40 R 10,505,39 R 10,505,30 R 10,5	12.87 192.48 1.92 1.93 1.93 1.93 1.93 1.93 1.95 1.95 1.95 1.95 1.95 1.95 1.95 1.95				
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	R 72940.50 R 73940.50 R 73940.50 R 90.015.40 R 90.015.40 R 10.505.39 R 10.505.39 R 10.505.39 R 10.505.39 R 10.505.39 R 10.505.39 R 10.505.39 R 10.505.39 R 10.505.39 R 10.505.39	12.87 192.48 1,192.49 1,10.56 81.00 0.85 0.00 0.85 10.26 110.56 134.71 0.00 0.00 0.48.90,20 1,153.20 1144.86 1104.12 1144.86 1104.12 1144.86 1104.12 1144.86 1104.12			Pinal groundwater modeling	G (J)
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	R 78 940.50 R 78 940.50 R 78 940.50 R 90.015 40 R 90.015 40 R 10.555.39 R 10.555.39	12.87 192.48 1.93 0.76 81.00 0.85 0.00 0.85 10.47 0.00 0.00 0.00 0.00 0.00 0.00 0.00			Engineering drawings & specifications Engineering & procurement of specialist work	4 60 10
		12.87 192.48 1.93 1.0.76 81:00 0.85 0.85 0.85 0.85 0.85 0.85 0.85 0.	12.5% of Subtotal 1		Preliminary and general	3 -
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		12.87 192.48 1.94 0.76 81.00 0.85 0.85 104.77 109.00 24.803.20 104.48 104.48 104.48 104.48 104.48 104.48 104.48 104.48 104.48 104.48				
1		12.87 192.48 1.93 0.76 8100 0.85 6100 0.85 0.87 193.71 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	Main Substation Sub-Station/MCC	3,3,3		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		12.87 192.48 1.93 0.76 810.05 0.85 0.85 0.85 0.83 134.71 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	Weigh Bridge	~ ~		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		12.87 192.48 1.93 0.76 10.56 81.00 0.85 0.00 0.85 134.71 0.00 0.00 0.00 1.153.20 1.153.20	Helicopter Pad Waste Skip Area	20		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		12.87 192.48 1.91 0.76 10.56 10.56 10.4.71 0.00 0.00 0.00 0.00 0.00	Energy Dissipator Solution Trench	3, 3,		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		12.87 192.48 1.91 0.76 10.56 81.00 0.85 134.71 0.00	Silt Trap		assessment) Concrete Slabs & Light Structures	15 (C)
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		12.87 192.48 1.91 0.76 10.56 81.00 0.85 0.85 134.71	All Areas	MUS	study) Specialist study (Overall quantified risk	15 (B)
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		12.87 192.48 1.91 0.76 10.56 81.00 0.85	General Surface Rehabilitation All Areas	SUM	Specialist study (Water pollution potential	15 (A)
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		12.87 192.48 1.91 0.76 10.56	Processing Plant Area	"		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		12.87 192.48 1.91	Overburden & Spoils Evaporation Ponds			
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		12.87 192.48	Administration	ha		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		12.87	Areas & Concrete Areas		E to a years of maintenance of attendance	3
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		00	Open Cast Voids & Ramps		2 to 2 years of maintanance & alternance	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		3.051.37	Processing Plant Area			20
1 1 1 R3.980.7794 1 1 1 R3.980.794 1 1 1 R1.652.807.94 1 1 1 R1.652.751.79 1 1 1 R4.98.256.64 1 1 1 R4.98.256.64 1 1 1 R4.98.256.64 1 1 1 R4.98.267.716 1 1 R4.98.267.716 1 1 R4.98.903.81 1 1 1 R4.98.903.81 1 1 1 R6.1,00.03		9.01	Access Roads N/A	ha	River diversions (to be decommissioned)	
1	ı	0.13	Additional Concrete Areas	200		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1.1	30.78	Construction Admin & Laydown	ha		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		6.52	Mining Complex	C. 10		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1	37.40	Surrounding Areas of TSF	72	General surface rehabilitation	10
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		0.00	N/A	ha	metal-rich waste) Rehabilitation of subsided areas	9
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		0.00	N/A	1007	Rehabilitation of processing waste deposits & evaporation ponds racidic.	8 (C)
1 1 R50,00 1 1 1 R30,90 1 1 1 R1,858,80 1 1 1 R1,858,80 1 1 1 R4,867,75 1 1 1 R4,868,90 1 1 1 R4,868,90 1 1 1 R4,868,90 1 1 1 R4,868,90 1 1 R61,868	R 124,113.68	0.50	Pollution Control Dam	72		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		0.50	Process Water Dam	200	producing waste)	
1 1 R50,00 1 1 1 R30,90 1 1 1 R1,858,80 1 1 1 R1,857,75 1 1 1 R498,25 1 1 1 R498,25	1 1	39.21	SWD & RWD		Rehabilitation of processing waste deposits & evaporation ponds basic salt	8 (B)
1 1 R50,00 1 1 1 R30,99 1 1 1 R1,858,80 1 1 1 R1,858,77		5.56	Waste Dump 2	-	Rehabilitation of overburgen & spoils	
1 1 R58,00 1 1 R30,90 1 1 R1,658,80 1 1 R1,667,72		0.00	NA	m <sup>3</sup>	Sealing of shafts, adits & inclines	1
1 1 R58,08	- 1	12.87	Opencast Pil	ha	Opencast rehabilitation including final	6
1 1 R 58,08	R 285.15	108.65	Mining Complex			
7,070		203.71	Laboratory	m <sub>2</sub> m		
1 1 R33,56	1 1	117.70	Change House	m <sup>2</sup>		
1 1 R 22,56		79.22	Access Control & Security  Administration	3, 3,	Demolition of housing &/or administration facilities	Ch
1 1 RO.00		0.00	N/A	я	Demolition & rehabilitation of ron electrified railway lines	<u>w</u>
1		0.00	N/A	3	Demolition & rehabilitation of electrified railway lines	
1 1 R 166,3		6,518,79	Mining Complex	m <sub>2</sub> m		
1 1 R 370,74		14,531.47	Processing Plant Area			1
1 1 R 3,424,11		16,296.97	TSF Area		Rehabilitation of access roads	ω
1 H 117,123.96	R 210.11	557.45	Conveyor Bell Foundations	m <sub>2</sub> m		
1 B 23 77		113 17	Crushing/Screening Pollution Control Dam	100		
1 1 R33,29		158 44	Secondary /Tertiary			
1 1 R 433,72		2,064.28	Ouatinary Separation	m <sub>2</sub>		
1 1 R 272,02		1,294.70	Milling	1 ~ 1		
1 1 R 182,61		869.17	Product Storage/Pumping	4 19		
1 1 R 269,67		1,283.52	Tailings Thickening Process Thickening	m <sup>2</sup>		
1 1 R513,617.97	R 210.11	2,444.55	Workshop & Stores Sewage Plant	10 10	Demolition of reinforced concrete buildings & structures	2 (B)
1 1 R			N/A	m²	Demolition of steel buildings & structures	Â
	R 10.24		Seconday / Iertary Crushing/Screening, Screening, Quatinary Crushing, Magnetic Separation, Milling, Process Thickening, Tailings Thickening,	a	Usemantling of processing plant & related structures (incl. overland conveyors & power lines)	-
factor factor 1 (Rands) Step 4.3 Step 4.4	Step 4.3					
D I	B Master rate N	A Quantity	Operational Area	Unit:	Description:	o.
					Turquoise Moon - Year 3	Area

0.00%
1.27%
0.05%
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Template for "rules-based" approach of the quantum for financial provision

CALCULATION OF THE QUANTUM

R 274 764.61 R 23 676.15 R 1 158 834.56 R 2 450 183.50 R 513 617.51 R 269 676.72 R 269 676.72 R 182 619.82 R 30 899.33 R 133 160.23 R 133 290.11 R 39 948.01 R 1 535 544.99 R 1 620 853.07 R 4 866 993.81 R 10 022 216.81 R 61 804.03 R 61 804.03 R 97 900.87 R 000 R 8 034.79 R 322 752.81 R 1 279 021.00 R 8 908.40 R 1 415 201.91 R 0.00 R 149 916.00 R 3 224 416.00 R 46 5126 R 18 822.06 R 18 832.06 R 13 535.60 R 53 249 755.01 R 1 064 995.30 R 1 064 995.10 R 1 331 243.88 R 5 324 975.50 R 72 486 229.01 R 0.00 R 0.000 R 0.0 R 82 634 301.08 R 6 989 030.35 R 1 331 243.88 R 10 148 072.06 R 122 589 29 R 160 064,02 R 33 561,72 R 16 780,86 R 30 980,00 R 1 858 807,94 R 5 602 965,11 R 0.00 R 67 161 253.51 R 0.00 R 925 984,4 GRAND TOTAL Sub Total 1 to 15 Above) Sub Total 2 Sub Total 3 (Subtotal 2 plus contingency) 1.05 Weighting factor 2 (step 4.4) Multiplication factor Step 4.3 R 285.15 R 10 505.39 R 83 442.81 R 0.00 R 78 940.50 R210.11 R210.11 R25.51 R25.51 R25.51 R25.51 R25.51 R25.51 R25.51 R 135.07 R 300 000.00 rate Step 4.3 Mastern 14.0% of Subtotal 3 6.0% of Subtotal 1 2.0% of Subtotal 1 2.5% of Subtotal 1 10.0% of Subtotal 1 2.5% of Subtotal 0.00 15.41 16.27 39.21 80.75 0.50 0.7888 0.00 37.40 48.27 6.52 30.78 2.61 0.13 9.01 9.01 0.00 0.79 38.61 233.23 1153.20 108.00 355.50 144.86 104.12 154.82 448.17 0.00 2 444,55 95.07 1 283,52 869,17 1 43,21 1 294,70 2 064,28 633,77 1 58,44 1 190,13 557.45 557.45 16.296.97 49.855.00 14.531.47 19.148.94 6.518.79 0.00 79.22 561.34 117.70 58.85 203.71 108.65 6 518.79 0.00 A Quantity Processing Plant Area Pollution Control Dam Open Cast Volids & Ramps Operational TSF, Surrounding Areas & Concrete Areas Reinforced Concrete Buildings Secondary Tertiary
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Demolition & rehabilitation of non
electrified railway lines
Demolition of housing &/or edministration Salt Dismanting of processing plant & related structures (incl. overland conveyors & power lines) Demoition of steel buildings & structures Demoition of reinforced concrete buildings & structures Administration & supervision costs Engineering drawings & specifications Engineering & procurement of specialist Opencast rehabilitation including final voids & ramps Sealing of shafts, adits & inclines Rehabilitation of overburden & spoils on & rehabilitation of electrified Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)
Rehabilitation of subsided areas General surface rehabilitation Rehabilitation of processing waste deposits & evaporation ponds (basic, producing waste) work Development of a closure plan Final groundwater modeling Turquoise Moon - Year 4 Contingency 8 VAT 15 (A) 15 (B) 2 (A) 15 (C) Area 4 (A) 4 (B) 8 (A) 13 8 (B) 8 (C) No. 4

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Description:	R 1 257 25				2.0% of Subtotal 2.5% of Subtotal			Engineering drawings & specifications Engineering & procurement of specialist work	ω 4
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Department of the control of the c	R 1 416 13			R 10 505.39	134.80	General Surface Rehabilitation All Areas			15 (A)
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Department of another from the first of processing plant & entire of control plant & entire of	H 338 8			R 10 505.39	32.26	Overburden & Spoils	ha		
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Description:   Unit:   Operational Area   Description:   Secondary Flerings   Security	R 3 132 0	3,44	- 24	R 10 505.39	298.13	Operational TSF, Surrounding Areas & Concrete Areas	- 8	tenance &	14
Description:   Unit:   Operational Avas	R 23 6			R 30 015.40	0.79 39.32	Opencast Pit	100	Water management	ü
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Description:   Unit:   Operational Aces	R 10 3			R 78 940.50	0.13	Additional Concrete Areas	2.45		
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Description: Unit: Operational Area				B 83 442 81	0.00	N/A		metal-rich waste) Rehabilitation of subsided areas	
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Description:   Unit:   Operational Area   Ountry   August   Step 4.5   Step 4.5   Step 4.3   Step 4.3   Step 4.4   Step 4.5   Step	R 61 8	1		R 124 113.68	0.50	Raw Water Dam Pollution Control Dam	200		
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Description:   Unit:   Operational Area	R 1 858 8			R 285.15	6 518.79 39.32	Mining Complex Opencast Pit		Opencast rehabilitation including final	6
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Description:   Unit:   Operational Area				H 135.07	0.00	N/A	3	rallway lines Demolition & rehabilitation of non	
Description:   Unit:   Operational Area	R 166 3			R 25.51	6518.79	Mining Complex	a a.	Demolition & rehabilitation of electrified	4 (A)
Description:   Unit:   Operational Area	R 370 7		-1-2	R 25.51	14 531.47	Processing Plant Area Haul Roads	~		
Description:   Unit:   Operational Area	H 3 424 1		در بد	H 210.11	49 855.00	TSF Area	.915	Rehabilitation of access roads	ယ
Description:   Unit:   Operational Area	R 1171	-		R 210.11	557,45	Conveyor Belt Foundations			
Description:   Unit:   Operational Area   A B C C D	H 23 7		-	R 210.11	113.17	Crushing/Screening Pollution Control Dam	3.5		
Description:   Unit:   Operational Area   A B C C Description:   Unit:   Operational Area   Ouanity   Master rate   Multiplication   Multipl	R 33 2	4 1	-4	R 210.11	158,44 190,13	Screening Secondary /Tertiary	70		
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Description:   Unit:   Operational Area   A B C C D	R 272 0		د مدر د	R210.11	1 294.70	Milling	" "		
Description:   Unit:   Operational Area   A	R 182 6		4 -4	R210.11	869.17	Product Storage/Pumping Water Treatment	~ ~		
Description:   Unit:   Operational Area   A	R 269 6			R 210.11	1 283.52	Tailings Thickening Process Thickening	100 110		
Turquoise Moon - Year 5    Description:   Unit:   Operational Area   Quantity   Master rate   Multiplication   Very factor   fact	R 199	ع بد		H 210.11	95.07	Sewage Plant	1000	buildings & structures	
Turquolse Moon - Year 5  Description:  Unit:  Operational Area  Operational Area  Ouanity  Master rate  Multiplication  Factor 1  Factor	T T	-		R 142.57	0.00	N/A	" "	Demolition of steel buildings & structures	2 (A)
Turquoise Moon - Year 5  A  Description:  Unit: Operational Area Quantity Master at factor fa			3			Crushing/Screening, Screening, Quatinary Crushing, Magnetic Separation, Milling, Process Thickening, Tallings Thickening, Process Water & Product Storage		structures (incl. overland conveyors & power lines)	
Turquoise Moon - Year 5  Description: Unit: Operational Area Ouanity Master rate Multiplication Weighting factor 1	B 025 0	Step 4.4	Step 4.3	Step 4.3	Step 4.5	Secondary Terriary	~	Dismantling of processing plant & related	-
Turquoise Moon - Year 5	E=A*B*C*I Amount (Rands)	Weighting factor 1	C Multiplication factor	B Master rate	A Quantity	Operational Area	Unit	Description:	No.

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The Control Office of Part	The Control Charles   1971	The Control Charles	The Control Charles	The Control Office Charter of the	The Content of Energy (1971)   Fig. 15   Fig	The Control Charactering	The Content of Part   The Content of Part	The Control Control Charles   1971	The Control Control Charles   1971	The Control Charactering	The Control Chernol Date   The Chernol Chernol Date   The Che	The Control Cherical Data   The Control Cherical Data   The Control Cherical Data   The Cherical Data	The Control Control Charles   1971	The Control Office Charter of the	The Content of Part Area   Factor   F	The Control of Date   The Control Of Date	The Control Charles Charles Charles   1971   8 1701   1   1   1   1   1   1   1   1   1
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March Country Country Charles   2557-45   72   73   73   74   74   74   74   74   74	March Conveyor Care Pervasions   253-74   74   74   74   74   74   74   74	March Control Chart Ch	March Control Chart Ch	Mainty Comparing Country   Part Actes   2557-46   R 2011   1   1   1   1   1   1   1   1   1	Mainty Compared Council Data   Mainty Council	Conveyer Feel Fernanders   2557-46   R 2011   1   1   1   1   1   1   1   1   1	Mainty Control Court Dame   15,574   78,751   11   11   11   11   11   11   11	Conveyer Cheric Dame   Parity   R 2011   1   1   1   1   1   1   1   1   1	Conveyer Cheric Dame   Parity   R 2011   1   1   1   1   1   1   1   1   1	Conveyer Feel Fernanders   2557-46   R 2011   1   1   1   1   1   1   1   1   1	Conveyer Feel Feel Feel Feel   Feel Feel Feel Fe	Conveyer Feel Feel Feel Feel   Feel Feel Feel Fe	Conveyer Cheric Dame   Parity   R 2011   1   1   1   1   1   1   1   1   1	Mainty Comparing Country   Part Actes   2557-46   R 2011   1   1   1   1   1   1   1   1   1	Mainty Compared Colorical Dame   Political Colorical Colorical Dame   Political Colorical Dame   Political Colorical Co	Mainty Company Colored Dame   1557-46   87 2011   1   1   1   1   1   1   1   1   1	Mainty Comparing Country   Part Activate   P
The Control Recomption	The Control Countries	The Control Controls	The Control	The Concept Access of the Concept Access of the Concept Access (Concept Access of the Concept Access (Concept Access (Concep	March   Country   Countr	The Control Country   Co	The Control Country	The Concept Access of the Control	The Concept Access of the Control	The Control Country   Co	The Control Room	The Control Room	The Concept Access of the Control	The Concept Access of the Concept Access of the Concept Access (Concept Access of the Concept Access (Concept Access (Concep	The Control Country   Co	The Control Country   Co	Main
Tight Reads	Tight Rough	Tight Residue	Tight Received Part Assess   14 (25) 1.7   Tight Received Part Ass	Tight Read	Proceeding Plant Area   60 855 00   R 725 51   1   1   1   1   1   1   1   1   1	Tight Reads	Proceeding Plant Area   60 855 O   R 255 O   1   1   1   1   1   1   1   1   1	Tight Read	Tight Read	Tight Reads	Tight Reads	Tight Reads	Tight Read	Tight Read	Processing Plant Area	Proceeding Plant Area   60 855 00   R 725 5   1   1   1   1   1   1   1   1   1	Proceedings
March Control Bushard	Manual Broades	March Control & Security   19 148 pt   R 25 5   N 1   N 1	March   Processing Plant Areas   14,531.4   R, 25.5   N   N   N	Processing Plant Areas	Processing Plant Areas	Manual Complete   Manual Com	Manua Complex   14,531.47   R, 25.5   N   N   N	Processing Plant Areas	Processing Plant Areas	Manual Complete   Manual Com	Processing Plant Areas	Processing Plant Areas	Processing plant Areas				
The control of Security   Control of Secur	The control of the	The control of the	The control of the	Marco Complete	Marco Computed   0.10	The control of Security   19 22   R 286 15   R 286 15	Marco Complete	Marco Complete	Marco Complete	The control of Security   19 22   R 286 15   R 286 15	March Compared   0.10   0.20   0.25	March Compared   0.10   0.20   0.25	Marco Complete	Marco Complete	Marco Computer	Marco Complete	Marco Complete
MA	NA	MA	MA	Market Damp 2	March   Marc	March Charles   March Charle	March   Marc	Market Damp 2	Market Damp 2	March Charles   March Charle	MA	MA	Market Damp 2	Market Damp 2	MA   MA   MA   MA   MA   MA   MA   MA	MA   MA   MA   MA   MA   MA   MA   MA	MA   MA   MA   MA   MA   MA   MA   MA
MA	Manage Control Security   79 22   R 7826 15   1   1   1   1   1   1   1   1   1	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	Many Control Stockey   79 22   R 2821   1   1   1   1   1   1   1   1   1
Access Control & Security   579.22   R. 285.15   1   1   1   1   1   1   1   1   1	Access Control & Security   Sep 22   R 285 15   1   1   1   1   1   1   1   1   1	Access Control & Security   79 22   R 7881 15   1   1   1   1   1   1   1   1   1	Access Control & Security   79 22   R 7881 15   1   1   1   1   1   1   1   1   1	Access Control & Security   59.22   R. 285.15   1   1   1   1   1   1   1   1   1	Access Control & Security   59.22   R. 286.15   1   1   1   1   1   1   1   1   1	Access Control & Security   579.22   R. 285.15   1   1   1   1	Access Control & Security   59.22   R. 286.15   1   1   1   1   1   1   1   1   1	Access Control & Security   579.22   R. 285.15   1   1   1   1	Access Control & Security   579.22   R. 285.15   1   1   1   1	Access Control & Security   579.22   R. 285.15   1   1   1   1	Access Control & Security   579.22   R. 286.15   1   1   1   1	Access Control & Security   579.22   R. 286.15   1   1   1   1	Access Control & Security   579.22   R. 285.15   1   1   1   1	Access Control & Security   59.22   R. 285.15   1   1   1   1   1   1   1   1   1	Access Control & Security   59.22   R. 285.15   1   1   1   1   1   1   1   1   1	Access Control & Security   59.22   R. 285.15   1   1   1   1   1   1   1   1   1	Access Control & Security   59.22   R. 285.15   1   1   1   1   1   1   1   1   1
Accessory   Septiment   Control	The control	March   Common   Co	March   Common   Co	Access Control & Security   Sept 24   P. 1281-15   P. 1	Access Countries Secuency   2613.42   P. 1250.15   P. 1	Access Control & Security   Sept 24   P. 1282   P. 128	Access Countries Countries Accessed   267.34   Access Countries Buildings   27.34   Access Countries Acce	Access Control & Security   Sept 24   P. 1281-15	Access Control & Security   Sept 24   P. 1281-15	Access Control & Security   Sept 24   P. 1282   P. 128	March   Comparing Protein   Comparing Protei	March   Comparing Protein   Comparing Protei	Access Control & Security   Sept 24   P. 1281-15	Access Control & Security   Sept 24   P. 1281-15   P. 1	Access Control & Sector(19)   Sept 24   P. 1250   P. 1	Access Control & Sectors   17.70   17.20   1	Access Control & Security   Sept 24   P. 1250   P. 125
The companies of the	The companion of the	Main	The companies of the	The composition of the composi	Mining Complex Notes   117   11   11   11   11   11   11	The control of the	Mining Complex Flower   117   17   17   17   17   17   17	The control of the	The control of the	The control of the	The complete control of the contro	The complete control of the contro	The control of the	The composition of the composi	Mining Complex Areas   117   118	The compact of the control of the	Mining Complex Areas   117   15   15   15   15   15   15   1
Teacher   Teac	Teacher   Teac	Teacher   Teac	Teacher   Teac	Teach Room   25.05   R 1285;   1   1   1	Table Room   250   R 1285, 15   1   1   1   1   1   1   1   1   1	Teach Room   258 8   R 285;   1   1   1   1   1   1   1   1   1	Teach Room   25.05   R 1255;   1   1   1	Teach Room   258 8   R 285;   1   1   1   1   1   1   1   1   1	Teacher   Teacher   200   Teacher	Teach Room   258 8   R 285;   1   1   1   1   1   1   1   1   1	Teach Room   258 56   1   1   1   1   1   1   1   1   1	Teach Room   258 56   1   1   1   1   1   1   1   1   1	Teacher   Teacher   200   Teacher	Teach Room   25.05   R 1285;   1   1   1	Teach Room   250 8   R 255, 15   1   1   1   1   1   1   1   1   1	Teach Room   25.05   R 255.15   1   1   1   1   1   1   1   1   1	Teach Room   263 8   R 285, 15   1   1   1   1   1   1   1   1   1
Main	Main	Main	Main	Main	Main	Main	Main	Main   Comparing	Main   Comparing	Main	Main	Main	Main   Comparing	Main	Main	Maint Compared   Main	Maint Compared   Com
March   Marc	Manual Compiese   6 518   1	Manage Compies   6 518   7	Manage Compies   6.518.5   1   1   1   1   1   1   1   1   1	Manual Complex   6 518   7	Manage Complex   6 518   7	Manual Complex	Manual Compies   6 518   7	Manual Complex   6 518   7	Manual Complex   6 518   7	Manual Complex	Manual Compiese   6 518   1	Manual Compiese   6 518   1	Manual Complex   6 518   7	Manual Complex   6 518   7	Manage Complex   6 518   7	NA   No.	NA   No.
Marco   Potential Pile   40.06   R 144 174 46   1	NA   Opericase   Pit   Operi	Marker Damp   100   160   161   162   16	Marker Dump	Marie Demotrate Pit	Marco   Control   Pin   A   Control   Pin   Pin   A   Control   Pin	Marie Demotrate Pit	Marca   Demotrata   Pi	Marie Demotrate Pit	Marie Demotrate Pit	Marie Demotrate Pit	Marie Demotrate Pil.   40.08   R 144 124 46   1   1   1	Marie Demotrate Pil.   40.08   R 144 124 46   1   1   1	Marie Demotrate Pit	Marie Demotrate Pit	March   Dependent   Picture   March	Marca   Demotrata   Pi	Marca   Pile   Acas
Marke Dump	Main Dump	Main	Marco	NAMERIO Dump 2	Main Dump	NAMERIA DUMP   16.00   19.0651.13   1   1   1   1   1   1   1   1   1	NAMERIA DUMP   16.050   F9.056.113   1   1   1   1   1   1   1   1   1	NAMERIA DUMP   16.050   19.0561.13   1   1   1   1   1   1   1   1   1	NAMERIA DUMP   16.050   19.0561.13   1   1   1   1   1   1   1   1   1	NAMERIA DUMP   16.00   19.0651.13   1   1   1   1   1   1   1   1   1	NAMERIO BOUND   16.050   R.9.056.113   1   1   1   1   1   1   1   1   1	NAMERIO BOUND   16.050   R.9.056.113   1   1   1   1   1   1   1   1   1	NAMERIA DUMP   16.050   19.0561.13   1   1   1   1   1   1   1   1   1	NAMERIO Dump 2	MAX	MAX   MAX	MAX   MAX
Missel Dump 2	National Damp 2	National Damp 2   16.90   18.90   18.90   19	National Damp 2   16.90   18.90   18.90   19	Notices Dump 1   16:00   F 996 651:13   1   1   1   1   1   1   1   1   1	Notices Dump 1   16:00   F 9:06 51:13   1   1   1   1   1   1   1   1   1	Notice Dump 1   16:00   F 996 651:13   1   1   1   1   1   1   1   1   1	Notices Dump 1   16:00   15:00   15:00   15   15   15   15   15   15   15	Notices Dump 1   16:00   Fig. 65:173   1   1   1   1   1   1   1   1   1	Notices Dump 1   16:00   Fig. 65:173   1   1   1   1   1   1   1   1   1	Notice Dump 1   16:00   F 996 651:13   1   1   1   1   1   1   1   1   1	Mainter Dump 1   16:00   F 996 651:13   1   1   1   1   1   1   1   1   1	Mainter Dump 1   16:00   F 996 651:13   1   1   1   1   1   1   1   1   1	Notices Dump 1   16:00   Fig. 65:173   1   1   1   1   1   1   1   1   1	Notices Dump 1   16:00   F 996 651:13   1   1   1   1   1   1   1   1   1	Notices Dump 1   16:00   F 99:051:13   1   1   1   1   1   1   1   1   1	Notices Dump 1   16:00   Fig. 65:1:3   1   1   1   1   1   1   1   1   1	Notices Dump 1   16:00   Fig. 651:13   1   1   1   1   1   1   1   1   1
Name	Name	Name	Name	NAMERIE Damin	NAMES   SANDER   16.95   16.95   17   17   18   18   18   18   18   18	NAMERIE Dump   16   10   10   10   10   10   10   10	NAMERIE Damin	NAMERIE Damin	NAMERIE Damin	NAMERIE Dump   16   10   10   10   10   10   10   10	Name	Name	NAMERIE Damin	NAMERIE Damin	NAMERIE Dump   165 92   8 1/24   13 66   1   1   1   1   1   1   1   1   1	NAMERIE Dump   16   10   10   10   10   10   10   10	NAMERIE Dump
Table   Tabl	Table   Tabl	Table   Tabl	Table   Tabl	Table   Tabl	Table   Tabl	Table   Tabl	Table   Tabl	Table   Tabl	Table   Tabl	Table   Tabl	Table   Tabl	Table   Tabl	Table   Tabl	Table   Tabl	Table   Ta	Table   Tabl	That STAND SEADOR         39.27 H 124 11568         1 H 124 11268         1 H 124 11268 <t< td=""></t<>
Name	Name	Name	Name	Na         Processor Wrater Dam         0.50         R 124 113.58         1         1           Na         Processor Wrater Dam         0.70         R 380 484.95         1         1         1           Na         Analyster Dam         0.70         R 380 484.95         1         1         1           Na         NA         Analyster Dam         0.70         R 83 442.81         1         1         1           Na         No         Na         Analyster Dam         0.00         R 83 442.81         1         1         1           Na         Topical Stockheles         48.45         R 78 840.50         1         1         1           Na         Topical Stockheles         48.45         R 78 840.50         1         1         1           Na         Topical Stockheles         48.45         R 78 840.50         1         1         1           Na         Concrete Areas         9.01         R 78 840.50         1         1         1           Na         Accesses Road         9.01         R 78 840.50         1         1         1           Na         Access Road         9.01         R 78 840.50         1         1         1	NA   Process Water Dam   0.50   R. 124 115.50   P. 1	NA   Process Wrater Dam   0.50   R. 124 113.58   Fig.	NA         Processor Wrater Dam         0.50         R 124 113.58         1         1           Na         Processor Wrater Dam         0.50         R 124 113.58         1         1         1           Na         Polition Control Dam         0.70         R 380 484.38         1         1         1           Na         NA         Anno Construction Admin & Laydown         0.70         R 83 442.81         1         1         1           Na         Toppiol Stockheles         48.45         R 78 840.50         1         1         1           Na         Toppiol Stockheles         48.45         R 78 840.50         1         1         1           Na         Toppiol Stockheles         48.45         R 78 840.50         1         1         1           Na         Concrete Areas         9.01         R 78 840.50         1         1         1           Na         Concrete Areas         9.01         R 78 840.50         1         1         1           Na         Accesses Reads         9.01         R 78 840.50         1         1         1           Na         Accesses Reads         9.01         R 78 840.50         1         1         1           <	NA         Processor Wrater Dam         0.50         R 124 113.68         1         1           Na         Processor Wrater Dam         0.50         R 124 113.68         1         1         1           Na         Political Control Dam         0.70         R 380 484.38         1         1         1           Na         NA         Political Control Dam         0.70         R 83 442.81         1         1         1           Na         Toppiol Stockholes         48.45         R 78 840.50         1         1         1           Na         Toppiol Stockholes         48.45         R 78 840.50         1         1         1           Na         Macross Roads         9.01         R 78 840.50         1         1         1           Na         Access Roads         9.01         R 78 840.50         1         1         1           Na         Documents Plant Aces         0.00         R 78 840.50         1         1         1           Na         Documents Plant Aces         0.00         R 78 840.50         1         1         1           Na         Documents Plant Aces         0.00         R 78 840.50         1         1         1           <	NA         Processor Wrater Dam         0.50         R 124 113.68         1         1           Na         Processor Wrater Dam         0.50         R 124 113.68         1         1         1           Na         Political Control Dam         0.70         R 380 484.38         1         1         1           Na         NA         Political Control Dam         0.70         R 83 442.81         1         1         1           Na         Toppiol Stockholes         48.45         R 78 840.50         1         1         1           Na         Toppiol Stockholes         48.45         R 78 840.50         1         1         1           Na         Macross Roads         9.01         R 78 840.50         1         1         1           Na         Access Roads         9.01         R 78 840.50         1         1         1           Na         Documents Plant Aces         0.00         R 78 840.50         1         1         1           Na         Documents Plant Aces         0.00         R 78 840.50         1         1         1           Na         Documents Plant Aces         0.00         R 78 840.50         1         1         1           <	NA   Process Wrater Dam   0.50   R. 124 113.58   Fig.	NA   Processes Wrater Dam   0.550   R 124 113 58   Pas Water Dam   0.550   R 124 113 58   Pas Water Dam   0.750   Pas Water Dam	NA   Processes Wrater Dam   0.550   R 124 113 58   Pas Water Dam   0.550   R 124 113 58   Pas Water Dam   0.750   Pas Water Dam	NA         Processor Wrater Dam         0.50         R 124 113.58         1         1           Na         Processor Wrater Dam         0.50         R 124 113.58         1         1         1           Na         Political Control Dam         0.70         R 380 484.38         1         1         1           Na         NA         Political Control Dam         0.70         R 83 442.81         1         1         1           Na         Toppiol Stockholes         48.45         R 78 840.50         1         1         1           Na         Toppiol Stockholes         48.45         R 78 840.50         1         1         1           Na         Macross Roads         9.01         R 78 840.50         1         1         1           Na         Access Roads         9.01         R 78 840.50         1         1         1           Na         Documents Plant Aces         0.00         R 78 840.50         1         1         1           Na         Documents Plant Aces         0.00         R 78 840.50         1         1         1           Na         Documents Plant Aces         0.00         R 78 840.50         1         1         1           <	Na         Processor Wrater Dam         0.50         R 124 113.58         1         1           Na         Processor Wrater Dam         0.70         R 380 484.95         1         1         1           Na         Analyster Dam         0.70         R 380 484.95         1         1         1           Na         NA         Analyster Dam         0.70         R 83 442.81         1         1         1           Na         No         Na         Analyster Dam         0.00         R 83 442.81         1         1         1           Na         Topical Stockheles         48.45         R 78 840.50         1         1         1           Na         Topical Stockheles         48.45         R 78 840.50         1         1         1           Na         Topical Stockheles         48.45         R 78 840.50         1         1         1           Na         Concrete Areas         9.01         R 78 840.50         1         1         1           Na         Accesses Road         9.01         R 78 840.50         1         1         1           Na         Access Road         9.01         R 78 840.50         1         1         1	NA   Process Water Dam   0.550   R 124 11558   F   F   F   F   F   F   F   F   F	NA   Process Water Dam   0.550   R 124 11558   F   F   F   F   F   F   F   F   F	Name
Page Wilder Corroto Dam   0.558 R 1.24.11388   1   1   1   1   1   1   1   1   1	Page Wilder Corroto Darm   0.00   R 380 64.85   1   1   1   1   1   1   1   1   1	Page   Maker Dam   0.500   R.360.0435   1   1   1   1   1   1   1   1   1	Page Wilder Corroto Dam   0.500   R.360.064.35   1   1   1   1   1   1   1   1   1	Page Wilden Control Darm   0.589   R. 124   1388   F. 1   F. 13   F.	has         Water Dam         0.500         R 786 1358         1         1           has         Wilden Control Dam         0.000         R 360 442.85         1         1         1           has         NAA         NA         0.000         R 80 442.81         1         1         1           has         Surrounding Areas of TSF         37.40         R 78 940.50         1         1         1           has         Mining Complex         6.52         R 78 940.50         1         1         1           has         Mining Complex         6.52         R 78 940.50         1         1         1           has         Mining Complex         6.52         R 78 940.50         1         1         1           has         Mining Complex         6.52         R 78 940.50         1         1         1           has         Mocross Roads         2.51         R 78 940.50         1         1         1           ha         Access Roads         2.51         R 78 940.50         1         1         1           ha         Access Roads         2.51         R 78 940.50         1         1         1           ha         Access Roads	Page Water Dam   0.588   R. 124   1388   1   1   1   1   1   1   1   1   1	Page Wilder Corroto Dam   0.589   R. 124   1368   F. 1   F. 13186   F. 131	Page Wilder Corroto Dam   0.589   R. 124   1388   F. 1   F. 1388   F. 1   F. 1388   F. 1   F. 1389   F. 13899   F. 1389   F. 13899   F. 13899   F. 13899   F. 13899   F. 13899	Page Wilder Corroto Dam   0.589   R. 124   1388   F. 1   F. 1388   F. 1   F. 1388   F. 1   F. 1389   F. 13899   F. 1389   F. 13899   F. 13899   F. 13899   F. 13899   F. 13899	Page Water Dam   0.588   R. 124   1388   1   1   1   1   1   1   1   1   1	NA	NA	Page Wilder Corroto Dam   0.589   R. 124   1388   F. 1   F. 1388   F. 1   F. 1388   F. 1   F. 1389   F. 13899   F. 1389   F. 13899   F. 13899   F. 13899   F. 13899   F. 13899	Page Wilden Control Darm   0.589   R. 124   1388   F. 1   F. 13   F.	has         Water Dam         0.500         R 786 1358         1         1           has         Poliution Control Dam         0.000         R 360 4428         1         1         1           has         NAA         NA         0.000         R 360 4428         1         1         1           has         Surrounding Areas of TSF         37.40         R 78 945.50         1         1         1           has         Mining Complex         6.52         R 78 949.50         1         1         1           has         Mining Complex         6.52         R 78 949.50         1         1         1           has         Mining Complex         6.52         R 78 949.50         1         1         1           has         Mining Complex         6.52         R 78 949.50         1         1         1           has         Mining Complex         6.52         R 78 949.50         1         1         1           ha         According Arm         0.00         R 78 940.50         1         1         1           ha         According Arm         0.00         R 78 940.50         1         1         1           ha         According Arm	has         Name of Control Darm         0.500         R 360 442.81         1         1           has         NVA         0.000         R 360 442.81         1         1         1           has         NVA         0.000         R 360 442.81         1         1         1           has         Surrounding Areas of TSF         37.40         R 78 945.50         1         1         1           has         Mining Complex         6.52         R 78 949.50         1         1         1           has         Mining Complex         6.52         R 78 949.50         1         1         1           has         Mining Complex         6.52         R 78 949.50         1         1         1           has         Mining Complex         6.52         R 78 949.50         1         1         1           has         Mining Complex         6.52         R 78 949.50         1         1         1           has         Access Roads         8.00         8.00         R 78 940.50         1         1         1           has         Access Roads         8.00         8.00         R 78 940.50         1         1         1           ha	Page Wilder Corrot Dam   0.500   R 350 4428   F 124 13588   F 1
Name   Poliution Control Darm   0.7888   18 124 11566   1	Name   Poliution Control Darm   0.7888   R 124 11266   1	ha         Pollution Control Dam         0.7888         R 124.11266         1         1           ha         N/A         NA         0.00         R 124.11266         1         1           ha         Surrounding Anneas of TSF         37.40         R 50.428.8         1         1         1           ha         Surrounding Anneas of TSF         37.40         R 50.428.8         1         1         1           ha         Surrounding Complex         48.45         R 78.840.50         1         1         1           ha         Accusar Poads         0.00         R 78.840.50         1         1         1           ha         Accusar Poads         0.178         R 78.840.50         1         1         1           ha         Accusar Poads         0.00         R 78.840.50         1         1         1           ha         Accusar Poads         0.00         R 78.840.50         1         1         1           ha         Accusar Separate         0.00         R 78.840.50         1         1         1           ha         Accusar Separate         0.00         R 78.005.30         1         1         1           ha         Accusar Separate	ha         Pollution Control Dam         0.7888         R 124.11268         1         1           ha         N/A         NA         0.00         R 124.11268         1         1           ha         Surrounding Anneas of TSF         0.00         R 364.428         1         1         1           ha         Surrounding Anneas of TSF         37.42         R 58.4428         1         1         1           ha         Surrounding Anneas of TSF         37.42         R 78.44250         1         1         1           ha         Accust Accuse Reads         0.00         R 78.84050         1         1         1           ha         Accuse Reads         0.10         R 78.84050         1         1         1           ha         Accuse Reads         0.10         R 78.84050         1         1         1           ha         Accuse Reads         0.10         R 78.84050         1         1         1           ha         Accuse Reads Plant Accuse         0.10         R 78.84050         1         1         1           ha         Accuse Reads Plant Accuse         0.10         R 78.94050         1         1         1           ha         Accuse &	NA	ha         NVA         NA         Poblicion Control Dam         0.7888         R 124 11566         1         1           ha         NVA         NVA         0.00         R 184 428         1         1         1           ha         NVA         0.00         R 184 428         1         1         1         1           ha         Notional Concrete Areas         6.52         R 78 84050         1         1         1           ha         Concrete Areas         2.61         R 78 84050         1         1         1           ha         Accidenzal Concrete Areas         0.13         R 78 84050         1         1         1           ha         Accidenzal Concrete Areas         0.10         R 78 84050         1         1         1           ha         Accidenzal Concrete Areas         9.01         R 78 84050         1         1         1           ha         December Strate         9.01         R 78 84050         1         1         1           ha         Operation Control Dam         4.02         R 78 84050         1         1         1           ha         Operation Control Dam         4.02         R 78 84050         1         1         <	NA   Nuk	NA	NAME   Pollution Control Darm   0.7888   R 124.11566   1	NAME   Pollution Control Darm   0.7888   R 124.11566   1	NA   Nuk	Name	Name	NAME   Pollution Control Darm   0.7888   R 124.11566   1	NA	ha         Pollution Control Dam         0.7888         R 14.11566         1         1           ha         NVA         NA         0.00         R 80.442.86         1         1         1           ha         NVA         0.00         R 80.442.81         1         1         1         1           ha         NVA         0.00         R 78.942.50         1         1         1         1           ha         Southwill Complex         48.45         R 78.942.50         1         1         1           ha         Controlled Ansat         2.61         R 78.942.50         1         1         1           ha         Controlled Ansat         2.61         R 78.942.50         1         1         1           ha         Controlled Ansat         2.61         R 78.942.50         1         1         1           ha         Accideronal Concrete Ansat         2.61         R 78.942.50         1         1         1           ha         Accideronal Control Dam         4.00         R 78.945.50         1         1         1           ha         Control Dam         4.00         R 78.945.50         1         1         1           ha	NA	ha         Pollution Control Dam         0.7888 R 12428         1         1           ha         NVA         0.00         R 12411266         1         1         1           ha         NVA         0.00         R 3204249         1         1         1           ha         NVA         0.00         R 32428         1         1         1           ha         Toppiol Stocypties         48.45         R 78 84050         1         1         1           ha         Control Boar         6.52         R 78 84050         1         1         1           ha         Control Boar         30.78         R 78 84050         1         1         1           ha         Control Boar         30.18         R 78 84050         1         1         1           ha         Acception Separation         30.18         R 78 84050         1         1         1           ha         Acception Separation         40.09         R 78 84050         1         1         1           ha         Acception Separation         40.09         R 78 84050         1         1         1           ha         Operation Separation         40.09         R 78 90.95.0 <t< td=""></t<>
NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA
Name	Name	Name	Numary Complex   Numary Complex   Numary Complex   Numary Construction Admin & Laydown   1, 187, 24.05   Numary Complex   N	NA   NA   NA	NA	NA   NA   NA   NA   NA   NA   NA   NA	ha         NAA           ha         Survanding Areas of 13F         37.40         R 80.00         1         1         1           A         Topical Constitucion Survanies         6.25         R 78 940.50         1         1         1           Na         Minima Connete Areas         6.25         R 78 940.50         1         1         1           Na         Access Roads         0.13         R 78 940.50         1         1         1           Na         Access Roads         0.00         R 78 940.50         1         1         1           Na         Access Roads         0.00         R 78 940.50         1         1         1           Na         Access Roads         0.00         R 78 940.50         1         1         1           Na         Access Roads         0.00         R 78 940.50         1         1         1           Na         Access Roads         0.00         R 78 940.50         1         1         1           Na         Access Roads         0.00         R 78 940.50         1         1         1           Na         Access Roads         0.00         R 78 940.50         1         1         1	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA	NA	NA	NA
NA   NA   NA   NA   NA   NA   NA   NA	NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	ha         NAA         Amounting Areas of TSF         37 40         R 3442.81         1         1           ha         Topsoil Stockpleise         37 40         R 78 3442.81         1         1         1           ha         Topsoil Stockpleise         6.52         R 78 940.50         1         1         1           ha         Accress Roads         0.13         R 78 940.50         1         1         1           ha         Accress Roads         0.01         R 78 940.50         1         1         1           ha         Accress Roads         0.01         R 78 940.50         1         1         1           m         Pocessing Plant Area         3.05 37         R 90.015.40         1         1         1           m         Pocessing Plant Area         3.05 37         R 90.015.40         1         1         1           ha         Operation Control Dam         4.00         R 78 840.50         1         1         1           ha         Operation Control Dam         4.00         R 78 840.50         1         1         1           ha         Operation Control Dam         4.00         R 78 840.50         1         1         1           <	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA
National Concrete Areas of 1 St 740	Name	National Controller Areas of 1947   1978 9405.05   1   1   1   1   1   1   1   1   1	National Concession From Page 1974   1975 9405.00   1   1   1   1   1   1   1   1   1	An Topsoid Stockpies	Name	An Topsoil Stockpiles	Name	An Topsoil Stockpiles	An Topsoil Stockpiles	An Topsoil Stockpiles	An Inspired Areas of 15-7-1-4	An Inspired Areas of 15-7-1-4	An Topsoil Stockpiles	An Topsoid Stockpies	Name	Name	Name
Main	Name	Main	Main	Maining Complex   Comple	Main Compress   Controlle   Main Compress   Controlle   Main Compress   Main	Maining Complex   Comple	Mainting Compilex	Maining Complex   Comple	Maining Complex   Comple	Maining Complex   Comple	Maining Complex   Comple	Maining Complex   Comple	Maining Complex   Comple	Maining Complex   Comple	Maintign Compilex	Maintign Compilex	Mining Compilex   Compilex   Constitution   Constitution   Compilex   Constitution   Constitut
Name	Na	Na	Na	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	National Concrete Areas	Name	Na
National Corrected Arease   2.61   R 78 940,500   1   1   1   1   1   1   1   1   1	Name	Name	Name	Page   Additional Correte Areas   2.51   R78 940.50   1   1   1   1   1   1   1   1   1	Page	Page   Access Roads   2.61   R78 940.50   1   1   1   1   1   1   1   1   1	Page	Page   Access Roads   2.61   R78 940.50   1   1   1   1   1   1   1   1   1	Page   Access Roads   2.61   R78 940.50   1   1   1   1   1   1   1   1   1	Page   Access Roads   2.61   R78 940.50   1   1   1   1   1   1   1   1   1	Page   Access Roads   2.51   R78940.50   1   1   1   1   1   1   1   1   1	Page   Access Roads   2.51   R78940.50   1   1   1   1   1   1   1   1   1	Page   Access Roads   2.61   R78 940.50   1   1   1   1   1   1   1   1   1	Page   Additional Correte Areas   2.51   R78 940.50   1   1   1   1   1   1   1   1   1	Page	Page Access Roads   2.61   R78 940.50   1   1   1   1   1   1   1   1   1	Page
National Controller Areas	Name	National Controller Areas	National Controlled Areas	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name
NA	National Processing Part Area   30,500   R 178 940,550   1   1   1   1   1   1   1   1   1	National Processing Part Area   20,000   R 178 940,500   1   1   1   1   1   1   1   1   1	Name	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA	NA   NA   NA   NA   NA   NA   NA   NA
Processing Plant Area   3051 37   R 90 05 1 1   1	Politution Control Dam	Marie Selection Plant Area   3051 37   R 90.05 40   1   1	Marie Control Dam   Agone	The control Dam	m         Processing Plant Area         3051 37         R 90.05         1         1           ha         Pollution Control Dam         0.79         R 30.015.40         1         1         1           ha         Operational TS, Surrounding         339.47         R 10.505.39         1         1         1           ha         Aperational TS, Surrounding         339.47         R 10.505.39         1         1         1           ha         Aperatoration Ponds         2.27         R 10.505.39         1         1         1           ha         Cherburden & Spoils         2.27         R 10.505.39         1         1         1           ha         Cherburden & Spoils         2.27         R 10.505.39         1         1         1           ha         Cherburden & Spoils         2.27         R 10.505.39         1         1         1           Na         Cherburden & Spoils         2.27         R 10.505.39         1         1         1           Na         Cherburden & Spoils         2.27         R 10.505.39         1         1         1           SUM         All Areas         0.00         R 500.000.00         1         1         1           SUM<	Processing Plant Area   3051 37   R 90 05 1 1   1	m         Processing Plant Area         3051 37         R 90.05         1         1           ha         Pollution Control Dam         0.79         R 30.015.40         1         1         1           ha         Operational TS, Surrounding         339.47         R 10.505.39         1         1         1           ha         Appendant Profes         1         R 10.505.39         1         1         1           ha         Administration         0.75         R 10.505.39         1         1         1           ha         Concrete Buildings         22.79         R 10.505.39         1         1         1           ha         Concrete Buildings         22.79         R 10.505.39         1         1         1           ha         Concrete Buildings         22.79         R 10.505.39         1         1         1           ha         Concrete Buildings         22.79         R 10.505.39         1         1         1           ha         Concrete Buildings         22.79         R 10.505.39         1         1         1           SUM         All Areas         8         R 10.505.39         1         1         1           SUM         All Area	Page	Page	Processing Plant Area   3051 37   R 90 05 1 1   1	The Processing Plant Area   3051 37   R 90 05 1 1   1   1   1   1   1   1   1   1	The Processing Plant Area   3051 37   R 90 05 1 1   1   1   1   1   1   1   1   1	Page	The control Dam	Page	Page	Page
Name	Name	Name	Name   Substitution Court	Name   Standard   1,00   R   1,00   1,00   R   1,00   1,00   R   1,00   R   1,00   R   1,00   R   1,00   R   1,00   R	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name   Standard   1,00   R   1,00   1,00   R   1,00   1,00   R   1,00   R   1,00   R   1,00   R   1,00   R   1,00   R	Name	Name	Name
Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	National Telesconting   339-47   R 10 505-39   1   1	National Telesconting   339-47   R 10 505-39   1   1	Name	Name	Name	Name	Name
Access & Concrete Access   1.91   R 10 505.39   1   1   1	Para   Accessing Plant Areas   19   R 10 505.39   1   1   1   1   1   1   1   1   1	Para Residence Aceas   191   R 10 505 39   1   1   1   1   1   1   1   1   1	Para Residence Aceas   191   R 10 505 39   1   1   1   1   1   1   1   1   1	Activates & Concrete Autoins	Acetalogue Aceas   1.91   R 10 505.39   1   1   1   1   1   1   1   1   1	Access & Concrete Access   1.91   R 10 505.39   1   1   1	Acetalogue Aceas   1.91   R 10 505.39   1   1   1   1   1   1   1   1   1	Acast & Concrete Auters   Acast & Concrete Buildings   1.91   R 10 505.39   1   1   1	Acast & Concrete Auters   Acast & Concrete Buildings   1.91   R 10 505.39   1   1   1	Access & Concrete Access   1.91   R 10 505.39   1   1   1	Parallet Residence Aceas   1.91   R. 10 505.39   1   1   1	Parallet Residence Aceas   1.91   R. 10 505.39   1   1   1	Aceas & Concrete Auters   Aceas & London	Activates & Concrete Autoins	Administration	Para   Administration   Administration	Para   Administration   Administration
Name   Administration   1-51   K1 056.39   1   1   1   1   1   1   1   1   1	National Concrete Businings	National Concrete Businings	National Concrete Businings	Name   Administration   1.75   Name	Name	Name   Administration   1.75   N. 10.565.39   1   1   1   1   1   1   1   1   1	Name	Name   Administration   1.75   Name	Name   Administration   1.75   Name	Name   Administration   1.75   N. 10.565.39   1   1   1   1   1   1   1   1   1	National Concrete Buildings	National Concrete Buildings	Name   Administration   1.75   Name	Name   Administration   1.75   Name	Name	Name	Name   Administration   1.75
Name	Name   Commented   200   1   1   1   1   1   1   1   1   1	Name	Name   Commentation   22.57   19   10.05.39   1   1   1   1   1   1   1   1   1	Name	National Continues   20.50   No.000.00   1   1   1   1   1   1   1   1   1	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name   Comparison   Compariso	Name   Separation   Separatio	Name
Page   Processing Plant Area   Processing Plant Area	Page   Processing Plant Area   1	Page   Processing Plant Area   Processing Plant Area	Page   Processing Plant Area   Processing Plant Area	Name	Name	Name	Name	Name	Name	Name	Page   Processing Plant Area   0.85   R 10 505.39   1   1   1   1   1   1   1   1   1	Page   Processing Plant Area   0.85   R 10 505.39   1   1   1   1   1   1   1   1   1	Name	Name	Page   Processing Plant Area   134 88   R10 565.39   1   1   1   1   1   1   1   1   1	Processing Plant Area   134 88   R10 505.39   1   1   1   1   1   1   1   1   1	Processing Plant Area   134 88   R10 505 39   1   1   1   1   1   1   1   1   1
National Processing Plant Area   14.89   R 10.505.39   1   1   1   1   1   1   1   1   1	Name	National Processing Plant Area   144.89   R 10.505.39   1   1   1   1   1   1   1   1   1	National Processing Plant Area   144.89   R 10.505.39   1   1   1   1   1   1   1   1   1	National Residence   1,00	National Residence   14.89   R 10 505.39   1   1   1   1   1   1   1   1   1	National Processing Plant Area   1,14,189   R 10,505,39   1   1   1   1   1   1   1   1   1	National Residence   14.489   R 10 505.39   1   1   1   1	National Processing Plant Area   1,14,189   R 10,505,39   1   1   1   1   1   1   1   1   1	National Processing Plant Area   1,14,189   R 10,505,39   1   1   1   1   1   1   1   1   1	National Processing Plant Area   1,14,189   R 10,505,39   1   1   1   1   1   1   1   1   1	National Residence   1,000	National Residence   1,000	National Processing Plant Area   1,14,189   R 10,505,39   1   1   1   1   1   1   1   1   1	National Residence   1,00	Name	Name	Name
Name of Secretary Surface Rehabilitation   194 89   R 10 505.39   1   1   1   1   1   1   1   1   1	National Surface Rehabilitation   194 89   R 10 505.39   1   1   1   1   1   1   1   1   1	National Surface Rehabilitation   194 89   R 10 505.39   1   1   1   1   1   1   1   1   1	National Surface Rehabilitation   194 89   R 10 505.39   1   1   1   1   1   1   1   1   1	National Sufface Rehabilitation   194 89	National Sulface Rehabilitation   194 89	National Sufface Rehabilitation   194 89	National Sufface Rehabilitation   194 89	National Sufface Rehabilitation   194 89	National Sufface Rehabilitation   194 89	National Sufface Rehabilitation   194 89	National Sulface Rehabilitation   194 89	National Sulface Rehabilitation   194 89	National Sufface Rehabilitation   194 89	National Sufface Rehabilitation   194 89	Name of Secretary Surface Rehabilitation   194 89   R 10 505.39   1   1   1   1   1   1   1   1   1	Name of Secretary Surface Rehabilitation   194 89	National Sulface Rehabilitation   194 89
Sulf Areas   0.00   R 500 000 00   1   1   1   1   1   1   1	Sulf Arians	Sulf All Areas	Sulf All Areas	SUM   All Areas	Sulface   Sulface   Cooperation   Cooperat	Sulf All Areas	SUM   All Areas	Sulface   Sulface   Coo   R 500 000 00   1   1   1   1   1   1   1	Sulface   Sulface   Coo   R 500 000 00   1   1   1   1   1   1   1	Sulface   Sulface   Coo   R 500 000 00   1   1   1   1   1   1   1	Sulf Areas	Sulf Areas	Sulface   Sulface   Coo   R 500 000 00   1   1   1   1   1   1   1	SUM   All Areas	SUM All Areas	SUM   All Areas	SUM All Areas
Start Trape	Start Trap	Start Traps	Start Traps	Start Trap	Start Trap	Sulf Areas   0.00   R.300 000.00   1   1   1   1   1   1   1   1   1	Start Trap	Still Trap	Still Trap	Sulf Areas   0.00   R.300 000.00   1   1   1   1   1   1   1   1   1	Sulf Areas   0.00   R.300 000.00   1   1   1   1   1   1   1   1   1	Sulf Areas   0.00   R.300 000.00   1   1   1   1   1   1   1   1   1	Still Trap	Start Trap	Still Trap	Still Trap	Star Trap
Sili Trap	Sin Trap	Sill Trap	Sill Trap	Silt Trap	Sill Trap	Sin Trap	Sill Trap	Sin Trap	Sin Trap	Sin Trap	Sin Trap	Sin Trap	Sin Trap	Silt Trap	Sill Trap	Sill Trap	Sin Trap
The first property   195.00   1   1   1   1   1   1   1   1   1	The first pubsication   195.00   1   1   1   1   1   1   1   1   1	The first probability   195.00   1   1   1   1   1   1   1   1   1	The first rapport	The first public part   The	The first public of the	The first public part   The	The first public part   Tabolog	The first publication	The first publication	The first public part   The	The first public part   Table   Tabl	The first public part   Table   Tabl	The first publication	The first public part   The	The first publication	The first public plane   118.00	The first procession
Solution Tench   24 803 20   R 130 00   1   1   1   1   1   1   1   1   1	Southion Tench   24 803 20   R 130 00   1   1   1   1   1   1   1   1   1	Solution Tench   24 803 20   R 130 00   1   1   1   1   1   1   1   1   1	Solution Tench   24 803 20   R 130 00   1   1   1   1   1   1   1   1   1	Solution Tench   24 893 20   R 130 00   1   1   1   1   1   1   1   1   1	Solution Tench   24 803 20   R 130 00   1   1   1   1   1   1   1   1   1	Solution Tench   24 803 20   R 130 00   1   1   1   1   1   1   1   1   1	Solution Tench   24 803 20   R 130 00   1   1   1   1   1   1   1   1   1	Solution Tench	Solution Tench	Solution Tench   24 803 20   R 130 00   1   1   1   1   1   1   1   1   1	Solution Tench   24 803 20   R 130 00   1   1   1   1   1   1   1   1   1	Solution Tench   24 803 20   R 130 00   1   1   1   1   1   1   1   1   1	Solution Tench	Solution Tench   24 893 20   R 130 00   1   1   1   1   1   1   1   1   1	Solution Tench   24 803 20   R 130 00   1   1   1   1   1   1   1   1   1	Solution Tench   24 803 20   R 130 00   1   1   1   1   1   1   1   1   1	Solution Trench   24 803 20   R 130 00   1   1   1   1   1   1   1   1   1
Maste Step Area   356.50   R 130 00   1   1   1   1   1   1   1   1   1	Main Substantiable   Main Su	Helicopter Pad   356.50   R 130.00   1   1   1   1   1   1   1   1   1	Helicopter Pad   356.50   R 130.00   1   1   1   1   1   1   1   1   1	Marie Copter Plad   356.50   R 130.00   1   1   1   1   1   1   1   1   1	Marie Seigh Area   356.50   R 130.00   1   1   1   1   1   1   1   1   1	Marie Copter Pad   356.50   R 130 00   1   1   1   1   1   1   1   1   1	Marie Selpe Pad   356.50   R 130.00   1   1   1   1   1   1   1   1   1	Marie Copter Pad   356.50   R 130.00   1   1   1   1   1   1   1   1   1	Marie Copter Pad   356.50   R 130.00   1   1   1   1   1   1   1   1   1	Marie Copter Pad   356.50   R 130 00   1   1   1   1   1   1   1   1   1	Marie Septement	Marie Septement	Marie Copter Pad   356.50   R 130.00   1   1   1   1   1   1   1   1   1	Marie Copter Plad   356.50   R 130.00   1   1   1   1   1   1   1   1   1	Main Substance   Main	Make Skip And   356.50   R 130.00   1   1   1   1   1   1   1   1   1	Main Substantiable   Main Su
Weigh Bridge   144.12   R 130.00   1   1   1   1   1   1   1   1   1	Weigh Bridge	Weigh Bridge	Weigh Bridge	Weigh Bridge   144.12   R 130.00   1   1   1   1   1   1   1   1   1	Main Substation   144.12   R 130.00   1   1   1   1   1   1   1   1   1	Weigh Bridge   144.12   R 130.00   1   1   1   1     1	Main Substation   144.12   R 130.00   1   1   1   1   1   1   1   1   1	Week Stonger Retueling   144.12   R 130.00   1   1   1   1   1   1   1   1   1	Week Stonger Retueling   144.12   R 130.00   1   1   1   1   1   1   1   1   1	Weigh Bridge   144.12   R 130.00   1   1   1   1     1	Weigh Bridge   144.12   R 130.00   1   1   1	Weigh Bridge   144.12   R 130.00   1   1   1	Week Stonger Retueling   144.12   R 130.00   1   1   1   1   1   1   1   1   1	Weigh Bridge   144.12   R 130.00   1   1   1   1   1   1   1   1   1	Main Substation   144.12   R 130.00   1   1   1	Weigh Bridge   144.12   R 130.00   1   1   1   1   1   1   1   1   1	Weigh Bridge   144.12   R 130.00   1   1   1   1   1   1   1   1   1
The state of the	The contingency   144   15	The contingency   144.12   130.00	The contingency   144.12   130.00   1   1   1   1   1   1   1   1   1	The first continue   154.82	The first continues   154.82   154.82   154.82   154.82   154.82   154.82   154.82   154.82   154.82   154.82   154.82   155.82   156.12	The series of	The first continue   154.82   150.00   1   1   1   1   1   1   1   1   1	The state of the	The state of the	The series of	The state of the	The state of the	The state of the	The first continue   154.82	Table   Tabl	Table   Tabl	The state of the
Main Substation   44817   R 130 00   1	Main Substation   448 12	Main Substation   44817   R 130 00   1	Main Substation   44817   R 130 00   1	Main Substation   448,17   R 130,00   1   1   1   1   1   1   1   1   1	Main Substation   448,17   R 130,00   1   1   1   1   1   1   1   1   1	Main Substation   448,17   R 130,00   1   1   1   1   1   1   1   1   1	Main Substation   448,17   R 130,00   1   1   1   1   1   1   1   1   1	Main Substation   448,17   R 130,00   1   1   1   1   1   1   1   1   1	Main Substation   448,17   R 130,00   1   1   1   1   1   1   1   1   1	Main Substation   448,17   R 130,00   1   1   1   1   1   1   1   1   1	Main Substation   44817   R 130 00   1   1   1   1   1   1   1   1   1	Main Substation   44817   R 130 00   1   1   1   1   1   1   1   1   1	Main Substation   448,17   R 130,00   1   1   1   1   1   1   1   1   1	Main Substation   448,17   R 130,00   1   1   1   1   1   1   1   1   1	Main Substation   448,17   R 130 00   1   1   1   1   1   1   1   1   1	Main Substation   448,17   R 130,00   1   1   1   1   1   1   1   1   1	Main Substation   448,17   R 130,00   1   1   1   1   1   1   1   1   1
Sub-Station/MCC   106.12   R 130.00   1   Sub Total 1	Sub-Station/MCC	Sub-Station/MCC   106.12   R 130.00   1   Sub Total 2   Sub Total 3	Sub-Station/MCC   106.12   R 130.00   1   Sub Total 2   Sub Color 2   Sub Total 3	Sub-Station/MCC   106.12   R 130.00   1   Sub Total 1	Sub-Station/MCC   106.12   R 130.00   1   Sub Total 1	Sub-Station/MCC   106.12   R 130.00   1   Sub Total 1	Sub-Station/MCC   106.12   R 130.00   1   Sub Total 1	Sub-Station/MCC   106.12   R 130.00   1   Sub Total 1	Sub-Station/MCC   106.12   R 130.00   1   Sub Total 1	Sub-Station/MCC   106.12   R 130.00   1   Sub Total 1	Sub-Station/MCC   106.12   R 130.00   1   Sub-Total 1   Sub-Station/MCC   106.12   R 130.00   1   Sub-Total 1   Sub-Total 1   Sub-Total 1   Sub-Total 1   Sub-Total 2   1.05   Sub-Order 1   2.5% of Subtotal 1   2.5% of Subtotal 1   2.5% of Subtotal 1   2.5% of Subtotal 1   Sub-Total 2   Sub-Total 2   Sub-Total 3   Sub-Total 3   10.0% of Subtotal 1   Sub-Total 3	Sub-Station/MCC   106.12   R 130.00   1   Sub-Total 1   Sub-Station/MCC   106.12   R 130.00   1   Sub-Total 1   Sub-Total 1   Sub-Total 1   Sub-Total 1   Sub-Total 2   1.05   Sub-Order 1   2.5% of Subtotal 1   2.5% of Subtotal 1   2.5% of Subtotal 1   2.5% of Subtotal 1   Sub-Total 2   Sub-Total 2   Sub-Total 3   Sub-Total 3   10.0% of Subtotal 1   Sub-Total 3	Sub-Station/MCC   106.12   R 130.00   1   Sub Total 1	Sub-Station/MCC   106.12   R 130.00   1   Sub Total 1	Sub-Station/MCC	Sub-Station/MCC	Sub-Station/MCC
12.5% of Subtotal 1   Weighting factor 2   1.05	12.5% of Subtotal 1   Weighting factor 2   1.05	12.5% of Subtotal 1   Weighting factor 2   1.05	12.5% of Subtotal 1   Weighting factor 2   1.05	12.5% of Subtotal 1   Weighting factor 2   1.05     2.0% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     3.0% of Subtotal 1   1.0% of Subtotal 1     3.0% of Subtotal 1   3.0% of Subtotal 2     3.0% of Subtotal 3   3.0% of Subtotal 3     3.0% of Subt	12.5% of Subtotal 1   Weighting factor 2   1.05     1.05   Subtotal 1   2.0% of Subtotal 1     2.0% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     3.0% of Subtotal 1   1.0% of Subtotal 2	12.5% of Subtotal 1	12.5% of Subtotal 1   Weighting factor 2   1.05     2.0% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     3.0% of Subtotal 1   1.0% of Subtotal 1     3.0% of Subtotal 1   1.0% of Subtotal 1     3.0% of Subtotal 1   3.0% of Subtotal 2     3.0% of Subtotal 3     3.0%	12.5% of Subtotal 1   Weighting factor 2   1.05     2.0% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   3.5% of Subtotal 1     3.0% of Subtotal 1   3.0% of Subtotal 1     3.0% of Subtotal 1   3.0% of Subtotal 2     3.0% of Subtotal 3   3.0% of Subtotal 3     3.0% of Subt	12.5% of Subtotal 1   Weighting factor 2   1.05     2.0% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   3.5% of Subtotal 1     3.0% of Subtotal 1   3.0% of Subtotal 1     3.0% of Subtotal 1   3.0% of Subtotal 2     3.0% of Subtotal 3   3.0% of Subtotal 3     3.0% of Subt	12.5% of Subtotal 1	12.5% of Subtoral 1	12.5% of Subtoral 1	12.5% of Subtotal 1   Weighting factor 2   1.05     2.0% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     3.5% of Subtotal 1   3.5% of Subtotal 2     3.5% of Subtotal 3   3.5% of Subtotal 3     4.00% of Subtotal 3   3.5% of Subtotal 3     5.5% of Sub	12.5% of Subtotal 1   Weighting factor 2   1.05     2.0% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     3.0% of Subtotal 1   1.0% of Subtotal 1     3.0% of Subtotal 1   3.0% of Subtotal 2     3.0% of Subtotal 3   3.0% of Subtotal 3     3.0% of Subt	12.5% of Subtotal 1   Weighting factor 2   1.05     1.05   Subtotal 1   Single 4.4)     Subtotal 1       2.0% of Subtotal 1	12.5% of Subtotal 1   Weighting factor 2   1.05     1.05   1.05   Subtotal 1     2.0% of Subtotal 1     2.5% of Subtotal 1     3.0% of Subtotal 2     (Subtotal 2 plus sum of management & administrative items, 1 to 6 above)     1.0.0% of Subtotal 1     1.0.0% of Subtotal 3     (Subtotal 2 plus ordingency)	12.5% of Subtotal 1   Weighting factor 2   1.05     12.5% of Subtotal 1   Cors. of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   2.5% of Subtotal 1     2.5% of Subtotal 1   Subtotal 2     (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)     10.0% of Subtotal 1   Subtotal 2 plus confingency
12.5% of Subtotal 1  (step 4.4)  (step 4.4)  2.0% of Subtotal 1  2.5% of Subtotal 1  3.5% of Subtotal 1  3.5% of Subtotal 1  3.5% of Subtotal 1  (Subtotal 2 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  (Subtotal 2 plus confingency)	1.2.5% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  3.5% of Subtotal 1  3.5% of Subtotal 1  4.0% of Subtotal 3  (Subtotal 2 plus contingency)	12.5% of Subtotal 1  2.0% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  2.5% of Subtotal 1  2.5% of Subtotal 1  2.5% of Subtotal 1  3.5% of Subtotal 1  10.0% of Subtotal 1  (Subtotal 2 plus contingency)  14.0% of Subtotal 3	12.5% of Subtotal 1  2.0% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  3.5% of Subtotal 3  (Subtotal 2 plus contingency)  14.0% of Subtotal 3	12.5% of Subtotal 1  6.0% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  3.0% of Subtotal 1  10.0% of Subtotal 1  (Subtotal 2 plus contingency)	12.5% of Subtotal 1  2.0% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  3.5% of Subtotal 1  (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  (Subtotal 2 plus contingency)	12.5% of Subtotal 1  2.0% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  2.5% of Subtotal 1  2.5% of Subtotal 1  2.5% of Subtotal 1  (Subjotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  (Subtotal 2 plus contingency)	12.5% of Subtotal 1  2.0% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  3.00 Total 2  (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  (Subtotal 2 plus contingency)	12.5% of Subtotal 1  2.0% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  3.0b Total 2  (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  (Subtotal 2 plus contingency)	12.5% of Subtotal 1  2.0% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  3.0b Total 2  (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  (Subtotal 2 plus contingency)	12.5% of Subtotal 1  2.0% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  2.5% of Subtotal 1  2.5% of Subtotal 1  2.5% of Subtotal 1  (Subjotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  (Subtotal 2 plus contingency)	12.5% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  3.5% of Subtotal 1  5.5% of Subtotal 1  (Subtotal 2 plus confingency)	12.5% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  3.5% of Subtotal 1  5.5% of Subtotal 1  (Subtotal 2 plus confingency)	12.5% of Subtotal 1  2.0% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  3.0b Total 2  (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  (Subtotal 2 plus contingency)	12.5% of Subtotal 1  6.0% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  3.0% of Subtotal 1  10.0% of Subtotal 1  (Subtotal 2 plus contingency)	12.5% of Subtotal 1  2.0% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  3.00% of Subtotal 1  (Subtotal 2 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  (Subtotal 2 plus outlingency)	12.5% of Subtotal 1  2.0% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  3.09 Total 2  (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  (Subtotal 2 plus ountingency)	12.5% of Subtotal 1  2.0% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  3.5% of Subtotal 1  (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  (Subtotal 2 plus confingency)
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No.	R 13 887 318.21								
Property Reso, 1927				13	14.0% of Subtota			VAT	8
Property Manuel   Property   Pr	R 99 195 130.06	Sub Total 3 contingency)	(Subtotal 2 plus						
Property Reserve   1000   10	R 7 287 061.90			al 1	10.0% of Subtata			Contingency	7 0
Propulsing No.	R 91 908 068.16	Sub Total 2 1 to 6 above)	s administrative items,	agement	subtotal 1 plus sum	(8			
Transport for Year	R 1 821 765.47			11	2.5% of Subtota			Development of a closure plan Final groundwater modeling	
Transport for Transport   Tr	R 1 821 765.47			11	2.5% of Subtota			Engineering & procurement of specialist work	
Transport for   Transport	R 4 372 237.14		Total date		6.0% of Subtota			Administration & supervision costs  Engineering drawings & specifications	
Interestable Services   Proposition Research   Proposition Researc	R 9 564 268.74	1.05	Weighting factor 2		al 1	12.5% of Subto		liminary and	
Propulsing Story - Year	H 72 870 618.96	to 15 Above)	(Sum of items 1						
Propulsité Boun - Four   Particulation   Par	R 13 795.60	1	4	R 130.00	106.12	Sub-Station/MCC			
Interpolate Association   Fig. 2   Proposed Section   Fi	R 20 126.73 R 58 261.71	1 2		R 130.00	154.82 448.17	Diesel Storage/Refueling Main Substation	20 20		
Interpolate Association   Part	R 18 832.06			R 130.00	104.86	Weigh Bridge	2 2		
Propulsing Moon	R 46 215.00	_		R 130.00	355.50	Helicopter Pad			
Propulsion Reson - Fate 7	R 14 040.00	1	1	R 130.00	108.00	Energy Dissipator Solution Trench	-		
Propulse Mont - Fax 7	R 149 916.00	1	1	R 130.00	1 153.20	Silt Trap		Concrete Slabs & Light Structures	
Propulse About - Fair 2   Calcination of Print Country	R 0.00	_	1	R 300 000.00	0.00	All Areas	MUS	Specialist study (Overall quantified risk	
Independent Assort Fear 7	R 0.00	1	1	R 500 000.00	0.00	All Areas	SUM	Specialist study (Water pollution potential	
Indiquition   Marie	H 1 418 220.60		4	R 10 505.39	135.00	General Surface Rehabilitation	na		
Interpolate Motor: Fast 7	R 2 652 785.64		1	R 10 505.39	252.52	Evaporation Ponds			
Introduction of interest planes is related   m	R 352 800.03			R 10 505.39	33.58	Overburden & Spoils	0 5		
Transporter Moon** First 7	R 20 057.90	-	-	R 10 505.39	1.91	Reinforced Concrete Buildings			
Tempolate Moon* Float 7	R 3 823 948.14	_		R 10 505.39	364.00	Areas & Concrete Areas		ance	
Temporidat Moon* Fisar 7	R 1 228 650.38	_	1	R 30 015.40	40.93	Opencast Pit			
Tempolate Moon* Fiear 7	R 274 764.61 R 23 676.15			R 30 015.40	3 051.37	Processing Plant Area Pollution Control Dam		Fencing Water management	13
Transporter Aborn - Fast 7	R 0.00	-		R 78 940.50	0.00	NA	П	River diversions (to be decommissioned)	=
The public of training at processing statutures in the public of training statutures (and training statutures)   The public of training statutures (and conveyors & controlled on the statutures)   The public of training statutures (and conveyors & controlled on training statutures)   The public of training statutures (and conveyors & controlled on training statutures)   The public of training statutures (and conveyors & controlled on training statutures)   The public of training statutures (and training statutures)   The public of training statutures)   The public of training statutures (and training statutures)   The public of training statutures)   The public of training	R 710 892.30		-1	R 78 940.50	9.01	Access Roads			
Temporary   Temp	R 205 753.68			R 78 940.50	2.61	Concrete Areas			
Temporite Abont - Fear 7	R 2 430 038.09	-	1	R 78 940.50	30.78	Construction Admin & Laydown			
Temposite Moon*-Year 7	R 3 832 890.11			R 78 940.50	48.55	Topsoil Stockpiles			
Topposite Monn-Year 7	R 0.00			R 0.00	37.40	Surrounding Areas of TSF		General surface rehabilitation	
Temposite Moon - Year 7	8000			0 00 00			1	metal-rich waste)	1
Production   Product   P	R 0.00	-	1	R 360 484.95	0.00	NA		Rehabilitation of processing waste deposits & evaporation ponds (acidic.	
Empiric Not   Indication   In	R 97 900.87	1		R 124 113.68	0.7888	Pollution Control Dam			
Torquoide Moon - Year 7	R 61 804.03		. 1	R 124 113.68	0.50	Process Water Dam		producing waste)	
Turquoise Moon** (Year 7   CALCULATION OF THE QUANTUM*   Year 7   Y	R 26 252 264.74			R 124 113.68	211.52	TSF - Basin		deposits & evaporation ponds (basic, salt	
Turquoise Moon - Year 7	R 1 718 503.92	_	-	R 99 651.13	17.25	Waste Dump 2	1		
Turquoise Moon - Year 7	R 1 628 056.33			R 99 651 13	16.34	Waste Dump 1	-	Sealing of shafts, adits & inclines Rehabilitation of overburden & spoils	
Turquoise Moon - Year 7	H 5 940 524.60			H 145 124.45	40.93	Opencast Pit	na	voids & ramps	
Turquoise Moon - Year 7	R 1 858 807.94	_	-	R 285.15	6 518.79	Mining Complex	m <sup>2</sup>		
Turquoise Moon - Year 7	R 58 087.72			R 285.15	108.65	Control Room			
Description:   Unit:   Operational Area   Outside Moon - Year 7   Operational Area   Outside Year	R 16 780.86	-	_	R 285.15	58.85	Tea Room			
Turquoise Moon - Year 7   CALCULATION OF THE QUANTUM   Turquoise Moon - Year 7   CALCULATION OF THE QUANTUM   CALCULATION OF THE Q	R 160 064.02			R 285.15	117.70	Administration Change House		laciities	
Turquoise Moon - Year 7	R 22 589.29	_	_	R 285.15	79.22	ec.		Demolition of housing &/or administration	
Turquoise Moon - Year 7	H 0.00	1	1	R 135.07	0.00	NA	3	Demolition & rehabilitation of non	
Turquoise Moon - Year 7	R 0.00	-4	_	R 247.63	0.00	Z		Demolition & rehabilitation of electrified railway lines	
Turquoise Moon - Year 7   Turquoise Majorelia - Turquoise Moon - Year 7   Turquoise Majorelia - Turquoise - Turq	H 166 314.39			H 25.51	6 518.79	Mining Complex	7		
Turquoise Moon - Year 7   CALCULATION OF THE QUANTUM   Trinnancial provision   Turquoise Moon - Year 7   CALCULATION OF THE QUANTUM   CALCULATION OF THE QUANTUM   To financial provision   Turquoise Moon - Year 7   CALCULATION OF THE QUANTUM   To financial provision   Turquoise Moon - Year 7   Turquoise Moon - Year 7   Calculating Screening, Screeni	R 370 742.63			R 25.51	14 531.47	Processing Plant Area		THE PERSON OF STREET OF STREET	(
Turquoise Moon - Year 7	R 3 424 119.88	_		R 210.11	16 296.97	Mining Complex	"	Dehabilitation of access roads	2
Turquoise Moon - Year 7	R 117 123.96	4	4	R 210.11	557.45	Conveyor Belt Foundations	~		
Turquoise Moon - Year 7	R 23 778 74		-	R 210 11	113 17	Crushing/Screening			
Turquoise Moon - Year 7   CALCULATION OF THE QUANTUM   CALCULATION OF THE QUANTUM	R 33 290.11			R 210.11	158.44	Screening Secondary /Tertiary			
Turquoise Moon - Year 7   CALCULATION OF THE QUANTUM   CALCULATION OF THE QUANTUM	R 133 160.23	1	1	R 210.11	633.77	Qualinary Separation	m²		
Turquoise Moon - Year 7   CALCULATION OF THE QUANTUM   CALCULATION OF THE QUANTUM	R 272 027 20		1 1	R 210.11	1 294.70	Mannetic Separation	-		
Turquoise Moon - Year 7   CALCULATION OF THE QUANTUM   CALCULATION OF THE QUANTUM	H 30 089.33			R 210.11	143.21	Water Treatment	-		
Turquoise Moon - Year 7  CALCULATION OF THE QUANTUM  CALCULATION OF THE QUANTUM  CALCULATION OF THE QUANTUM  COPERATION  COPERATION OF THE QUANTUM  A  B C Description:  COPERATION OF THE QUANTUM  COPERATION OF THE QUANTUM  A  B C Description:  COPERATION	R 269 676.72		_	R 210.11	1 283.52	Process Thickening			
Turquoise Moon - Year 7  CALCULATION OF THE QUANTUM  CALCULATION OF THE QUANTUM  CALCULATION OF THE QUANTUM  COPERATION OF THE QUANTUM  A  B  C  C  C  C  C  C  C  C  C  C  C  C	R 19 974.11			R 210.11	95.07	Sewage Plant	-	buildings & structures	
Turquoise Moon - Year 7  CALCULATION OF THE QUANTUM  CALCULATION OF THE QUANTUM  CALCULATION OF THE QUANTUM  Turquoise Moon - Year 7  County of the Quantity o	R 513 617.97			R 210.11	2 444.55	Workshop & Stores	-	Demolition of reinforced concrete	
Turquoise Moon - Year 7  CALCULATION OF THE QUANTUM  CALCU						Thickening, Tailings Thickening, Process Water & Product Storage			
Turquoise Moon - Year 7  CALCULATION OF THE QUANTUM  CALCU						Separation, Milling, Process		power lines)	70
Turquoise Moon - Year 7  CALCULATION OF THE QUANTUM  CALCULATION OF THE QUANTUM  CALCULATION OF THE OLIANTUM  A B C D E D A B C D E Multiplication factor factor factor factor Step 4.5  Step 4.5  Step 4.3  Step 4.3  Step 4.4	H 925 984.49	_		R 10.24	90470.13	Secondary /Tertiary Crushing/Screening, Screening,		Dismantling of processing plant & related structures (incl. overland conveyors &	-
Turquoise Moon - Year 7  CALCULATION OF THE QUANTUM  CALCU		Step 4.4	1	Step 4.3	Step 4.5		11		
Turquoise Moon - Year 7  CALCULATION OF THE QUANTUM  A R C D	Amount (Rands)	Weighting factor 1		Master rate	Quantity	Operational Area	Unit:	Description:	No.
Turnuoise Moon - Year 7	E=A*B*C*D	0			•				
Template for Tules-based approach of the quantum for financial provision					HE QUANTUM	CALCULATION OF T		Turquoise Moon - Year 7	11
The state of the s			YISIOII	illianciai pro	ine quantum to	inies-pased approach of	ipiate io	g	

0.00% 0.07% 0.037% 0.25% 0.25% 0.25% 0.05%

Processor   Proc	Control State   Control Stat	Companies   Comp	Particular   Par	4		7.56
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Secretary and processory and processory of the control of the co	Section of processory and a functional processory (1902)   10 (10 (10 (10 (10 (10 (10 (10 (10 (10	Content of the protection of the content of the c	Secretary of processory and secretary and	42		
Particular of the business of the control of the business of	Particular of size based on control of the contro	Particular of size bands   1	Particular of size backers of cookers   1, 20   1, 2		-	-
The control of contr	The control of contr	The control of contr	The control of contr	R 142.57		1 R5136176
Companies of proteins and proteins   1,000	Comparison of social policy and comparison of the comparison	The control of the	Company   Comp	R 210.11	1	1 R 19 974.1
Comparison of control between control contro	The control of the	The control of control between control of control between control of control between control control control between control	Comparison of the control to the c	R 210.11		1 R 269 676.7
The companies of the control of th	The companies of control basic at the control bas	The control of the	The control of the	R 210.11	-	1 R 182 619.8
The Control of Health Contro	The control of the	The control of a	The control of the	R 210.11	-	1 R 30 089.3
Part	The control of testing and the control of test	The control of excess orders order	Companies of function of fun	R 210.11		1 R 433 721.7
The control of the	Processor of the control of the co	The Company of the	The Company of the Company	R 210.11	-	1 R 133 160.2
The Control of Contr	Process   Proc	The control of access of the control of acce	Production of access category   Production   Production	R210.11		1 R 33 290.1
Particular of access colors   Particular of access colors   Particular of access colors	Particular of access outside   Particular of access outside   Particular outside   Particul	The control of secretary and the control of the c	Particular of access cutoff   Part	H 210.11	-	H 39 948.L
Compact   Comp	Company   Comp	Control of control o	Compact   Comp	R 210.11	-	1 R 23 778.7
Procession of access rotates   Procession	Procession of access rough   Process rough   Process rough   Process rou	Procession of the control of the c	Procession of secretary   Procession   Pro	R 210.11		. B 2 424 410
The control of the	Part	Processing Part American   1   15   15   15   15   15   15   15	Particular of the control of technical of the control of the con	D 25 51	-	1 B 1 271 956 1
Particularies of included feet infection   Particularies   P	Particularies of efficiency   Particularies   Particularies	Particular of the decided   Train Rounds   Train	Particular of the description of description   Particular of the description   Particular of the description   Particular of the description of description   Particular of the description of description   Particular of the description of the description of the description   Particular of the description   Particula	R 25.51	1	1 R 370 742.6
Accordance   Accode   Accordance   Accordance   Accordance   Accordance   Accordance   Accordance   Accordance   Accordance   Accordance   Accorda	Accordance   Acc	According to the desiration of electricide   n	Accordance   Acc	R 25.51		1 R 488 548.6
A	A	Marie   Mari	A	R 247.63		1 R 0.0
According to the selection of partial definition of partial selection	Accordance   Acc	Controlled by Controlled Business and Controlled Security   1912   1913   191	Accordance   Acc	D 136 A7	1	-
Processor of the proc	Commission of Notices & American Control & Security   Control Report   C	Approximation of the detection of the control of	Promotion of Notice & Part	10.00 H	-	
The following the page   The pa	The following the control of the c	The content of the	The following the page   The pa	R 285.15		1 R 22 589.2
The floors	The floors   The floor   The	The file of the control of the con	The following continue to the continue to th	R 285.15	-	1 R 33 561.7
Min	The Controlled Controlled Control Date   150 Miles	Main Control (1997)	The Controlled of State	R 285.15	-	1 R 16 780.8
Controverset instabilisation recluding final   Controverset for the best of the control final of the control fin	Approximate translation in culturing front   Approximate   Approximate	Approximate transmission for including final   Approximate   Approxima	Approximation founding founding founding completed in the State of R 14 55 124 46   1	R 285.15		1 H 58 087.7
Appendix	Appendix   Appendix	Appropriate the buildings on beliating to the buildings on beliating the buildings on beliating that the buildings on beliating to the buildings of the build	Appendix   Appendix	R 285.15	-	1 R 1 858 807.5
Separation of Information	Separating of Infuliate, seate & Includes   Marke Dump   6454   R 99 651 13   1   1   1   1   1   1   1   1   1	Separation of Invalidation of Professional Part   Mission Dump   645 ft   89 651 13   1   1   1   1   1   1   1   1   1	Separation of Information	R 145 124.46	-	1 R 19 832 476.3
Application of overlander & sporise   The Application of the Application   The Applica	Principle   Prin	Principalization of overlunder & spoils   Na   Waste Dump 1   \$454   \$6 16 13   \$1   \$1   \$1   \$1   \$1   \$1   \$1	Application of overlanding in a   Application of of overlanding in a   Applicat	R 76.54	-	1 R 0.0
Production of processing watch   Production Council Dam   Production Dam   Production Council Dam   Production Council Dam   Production Council Dam   Production	Production of processing watch   Production Control Dam	Production of proceeding watch   Product Control Dam	Production of processing watch   Production Council Dam   Production	R 99 651.13		1 R 5 435 275.6
Processing Water Dam   CS of R 124 113 88   1   1   1   1   1   1   1   1   1	Processing Value   Processing	The control of the	Processing Water Dam   Co. St. Act   Priza	R 124 113.68		1 R 4 866 993.8
Name	Name	Name	Producing wisties   National Control Dam	R 124 113.68	-	1 R 29 054 081.4
Percentisation of processing white	Perchibitation of processing states with the control Dame	Pre-bilitation of processing watch part   Pre-bilitation of processing watch part	Percentismation of processing standard control Dame	R 124 113.68		1 R 61 804.0
According to the decorrol source of subblication of the decorrol source of evalualization of processing water and administrative water and appearate of subblication of subblication of subblication and administrative and administrative forces.   According to the decorrol source of the decorrol so	According to the decormission of the decormission of the decormission of subsets and the decormission of the decormism of the deco	Accordingment of secretary waste   Na	According author retabilistion   Name   Na	R 124 113.68		1 R 97 900.8
Separation provide (socide)	Name of the process & evaporation profit (actor):	Name	Name of the processes & evaporation profit (actor);   Name of the processes & evaporation processes & evaporation profit (actor);   Name of the processes & evaporation processes & evaporatio	R 360 484.95	-	1 R 0.0
General surface retabilistion   Name of Control September   1974   197	General surface retablisation   Name of Control September   Name of	General surface retabilistion   Name of Concision Conc	General surface retablisation   Na National Control   Na Nationa			
According surface rehabilisation   Nat Surrounding Stockples   87.24   87.24   87.05   1   1   1   1   1   1   1   1   1	Decembrication   Nat Surrounding Stockheles   87.24   87.24   87.00   1   1   1   1   1   1   1   1   1	Accessing surface rehabilitation   Nat Surrounding National Stockheles   80.28   R 78 940.59   1   1   1   1   1   1   1   1   1	According surface rehabilisation   Nat Surrounding Nation   1	R 83 442.81	1	1 R 0.0
This includes   This include	This interpretation is supervision costs   The Supervision   This interpretation   The Administration   The Admi	Precident Control of	This improvement of the decommissioned   This improvement   This imp	R 0.00	-	1 R 0.0
Processor	Processory Engineering	Proceedings   Processor   Pr	Processory Engineering	H /8 940.50		1 B 514 596
Part   Access Roads   Part   Access Roads   2 to 1   1   77 8440 50   1   1   1   1   1   1   1   1   1	Part   Concrete Areas   2 of 1   R 78 940 50   1   1   1	Page	Part   Access Roads   Part   Access Roads   2 to 1   R 78 940 50   1   1   1   1   1   1   1   1   1	R 78 940.50	-	1 R 2 430 038.0
Para	Para	Para	Para	R 78 940.50	1	1 R 205 753.6
Prince decommissioned   Tria   Access Hoads   State	Precident of the Decommission and Decomposing Plant Area 3 265,376	Rescription   Para   Page	Precidential continuision and process page   Precidential continuision and process page   Precidential continuision and process page   Precidential continuision and page   Precidential continuis	R 78 940.50	-	1 R 10 369.
Feecing   Feec	Freeding	Feecing	Freeding	R 78 940.50		1 R 0.0
Vitate management   ha	Visite management   ha	Water management   Na	Vitate management   ha	R 90.05		1 R 274 764.6
2 to 3 years of maintenance & aftercare   Tai   Descriptional TS: Surrounding   386.57   R 10 505.39   1   1   1   1   1   1   1   1   1	2 to 3 years of maintenance & aftercase   Tai   Descriptional TSP. Surrounding   386.57   R 10 505.39   T   T   T   T   T   T   T   T   T	2 to 3 years of maintenance & aftercare   Tal   Depending   1.91   R 10 505.39   1   1   1   1   1   1   1   1   1	2 to 3 years of maintenance & aftercare   Tai   Descriptional TSF. Surrounding   386.57   R 10 505.39   1   1   1   1   1   1   1   1   1	R 30 015.40		1 R 23 676.
Page   Adea & Connecte Buildings   1.91   R 10.805.39   1   1   1   1   1   1   1   1   1	Administration & Supervision Coals   Parameterial Contingency   Parameterial Parameterial Contingency   Parameterial Parame	A	Pa	R 10 505.39		1 R 4 061 103.
The continuency of the continuency and general   The continuency and general   The continuency and general   The continuency and general   The continuency	Parameter   Para	The contingency and general and general first part of the contingency and general aroundwater modeling   12.5% of Subtotal 1   1.55% of Subtotal 1   1.5	The continuence of the continu	B 10 505 30	1	1 0 20 057
The contingency   The contin	Precision of the continuence o	Page   Contingency   Page   Contingency   Page	Page	R 10 505.39	-	1 R 8 034
Pacification of the contingency   Pacification	Precinity and general Subscription Contingency   Precinity and general Subscription S	Page Exposition Potential Study (Water pollution potential Study (Overall quantified risk Study)   All Areas	Precinity   Prec	R 10 505.39	1	1 R1177824.9
Specialist study (Water poliution potential Study (Water poliution potential Study (Water poliution potential Study (Specialist study (Water poliution potential Study Specialist study (Water poliution potential Study Specialist study (Water poliution potential Study Specialist study (Overall quantified risk. SUM All Areas	Specialist study (Water poliution potential Surface Perhabilitation   146.82   R 10.000   1   1   1   1   1   1   1   1   1	Specialist study (Water pollution potential Studies and Concerts State Rehabilistion   146.82 R 10.005 N 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Specialist study (Water poliution potential Surface Perbalitation   146.82   R 10.005   N 10.005	R 10 505.39		1 R 2 889 940.6
Specialist study (Water pollution potential SUM All Areas	Specialist study (Water pollution potential SUM All Areas	Specialist study (Water pollution potential SUM All Areas	Specialist study (Water pollution potential SUM All Areas	R 10 505.39	-	1 R 1 542 452
Specialist study (Overall quantified risk   SUM   All Areas   0.00   R 130.00   R 130.	Specialists study (Overall quantified risk Supplications	Specialist study (Overall quantified risk Study)   Specialists study (Overall quantified risk Study)   Specialists study (Overall quantified risk Study)   Specialists study (Overall quantified risk Study Dissipator   1153.20   R 130.00   1   1   1   1   1   1   1   1   1	Specialist study (Overall quantified risk Superally and planes study) (Overall quantified risk Superally Structures   153.20	R 500 000.00	-	1 R 0.0
Concrete Siaos & Light Structures	Concrete Slabs & Light Structures	Concrete Slabs & Light Structures	Concrete Siaos & Light Structures	R 300 000.00	-	1 R00
Concrete Slabs & Light Structures   m²   Structures   m²   Structures   m²   Structures   m²   Structures   m²   Structures   m²   Solution Tercen   108.00   1   1   1   1   1   1   1   1   1	Concrete Slabs & Light Structures	Concrete Slabs & Light Structures	Concrete Slabs & Light Structures			
The file of the	The file of the	The file of the	The file of the	R 130.00	-	1 R 149 916.
Maste Skiple	Maste Skyle Pad   355.50   R130.00   1   1   1   1   1   1   1   1   1	Maste State Pad   355.50   R 130.00   1   1   1   1   1   1   1   1   1	Maste Skyle Pad   355.50   R130.00   1   1   1   1   1   1   1   1   1	R 130.00	-	1 R 3 224 416.
Mass Skip Area   144 86   1730.00   1   1   1   1   1   1   1   1   1	Maste Style Area   144 86   R 130.00   1   1   1   1   1   1   1   1   1	Mass Skyle   Mas	Mass Skip Area   144 86   1730.00   1   1   1   1   1   1   1   1   1	R 130.00	-	1 R 46 215.
The transform of the control of th	The transform of the contingency   The conting	The second control of the control	The transform of the control of th	R 130.00		1 R 18 832.
Main Substation   448.17   R 130.00   1   1   1	Main Substation   448.17   R 130.00   1   1   1	The contingency   The contin	Main Substation   448.17   R 130.00   1   1   1	R 130.00		1 R 20 126.
12.5% of Sublotal 1   Neighting factor 2   1.05	12.5% of Sublotal 1   12.5% of Sublotal 2   12.5% of Sublotal 3   12.5% of Sublotal 3	12.5% of Subtotal   12.5% of Subtotal   1.05% of Subtotal   1.05	Total   Tota	R 130.00	-	1 R 58 261.
Sub form)   12.5% of Subtotal   12.5% of Subtotal   10.15 Above   1.05 Above   1.	Subtotal   12.5% of Subtotal   12.5% of Subtotal   10.15 Above   1.05 Above   1.0	12.5% of Subtotal   12.5% of Subtotal   12.5% of Subtotal   10.15 Above	Subtotal   12.5% of Subtotal   12.5% of Subtotal   12.5% of Subtotal   10.15 Above   1.05 Abov	130.00	Sub Tot	
12.5% of Subtotal   12.5	12.5% of Subtotal   12.5	12.5% of Sublotal 1   13.5% of Sublotal 1   13.5% of Sublotal 1   14.5% of Sublotal 1	12.5% of Subtotal 1   12.5% of Subtotal 2   1.05	ns)	-	
Inistration & supervision costs  2.0% of Subtotal 1  2.0% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  2.5% of Subtotal 1  2.5% of Subtotal 1  2.5% of Subtotal 1  3.5% of Subto	Instration & supervision costs  20% of Subtotal 1  30b Total 2  Sub Total 2  Sub Total 3  (Subtotal 2 plus contingency)  140% of Subtotal 3	inistration & supervision costs  enering drawings & specifications  2.0% of Subtotal 1  2.0% of Subtotal 1  2.5% of Subtotal 1  3.00 Total 2  (Subtotal 1 plus sum of management & administrative items 1 to 6 above)  (Subtotal 1 plus sum of management & Sub Total 3  (Subtotal 2 plus contingency)	Instration & supervision costs  20% of Subtotal 1  20% of Subtotal 1  20% of Subtotal 1  20% of Subtotal 1  25% of Subtotal 1  25% of Subtotal 1  25% of Subtotal 1  300 Total 2  (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10,0% of Subtotal 1  (Subtotal 2 plus contingency)  10,0% of Subtotal 3  (Subtotal 3 plus contingency)	Weightin		
neering a government of specialist 2.5% of Subotal 1  3.00 Total 2  (Subotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subotal 1  (Subtotal 1 plus confingency)  14.0% of Subtotal 3  (Subtotal 2 plus confingency)	reering drawings a specifications  2.5% of Subtotal 1  2.5% of Subtotal 1  2.5% of Subtotal 1  2.5% of Subtotal 1  Sub Total 2  (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  (Subtotal 2 plus contingency)  14.0% of Subtotal 3	referring drawings a specifications 2.0% of Subtotal 1 2.5% of Subtotal 1 3.00 Total 2 3.00 Total 3 3.00 Tot	neering à procurement of specialist  2.5% of Subtotail 1  3.00 Totail 2  (Subtotail 1 plus sum of management à administrative items, 1 to 6 above)  1.0.5% of Subtotail 1  (Subtotail 2 plus confingency)  1.4.0% of Subtotail 3			R 6 157 237.
Subtotal 1   Subtotal 1   Subtotal 1   Subtotal 1   Subtotal 2   Subtotal 3   Subtotal 3   Sub Total 2   Subtotal 4   Subtotal 4   Subtotal 5   Subtotal 6   Subtotal 1   Subtotal 6   Subtotal 1   Subtotal 7   Subtotal 1   Subtotal 3   Sub Total 3   Subtotal 8   Subtotal 9   Subtotal	Subtotal 1   Subtotal 1   Subtotal 1   Subtotal 1   Subtotal 2   Subtotal 2   Subtotal 3   Sub	Subtotal 1   Subtotal 1   Subtotal 1   Subtotal 1   Subtotal 2   Subtotal 3   Subtotal 3   Subtotal 3   Subtotal 4   Subtotal 4   Subtotal 4   Subtotal 5   Subtotal 6   Subtotal 7   Sub	Jopinent of a closure plan   2.5% of Subtotal 1   Sub Total 2     Guondwater modeling   Sub Total 2   Subtotal 1 plus sum of management & administrative items, 1 to 6 above)   10.0% of Subtotal 1   Sub Total 3   Sub Total 3   (Subtotal 2 plus confingency)   14.0% of Subtotal 3   (Subtotal 2 plus confingency)   14.0% of Subtotal 3   (Subtotal 3   Sub Total 3   (Subtotal 3   Sub Total 3   Sub Total 3   (Subtotal 3   Sub Total 3   Subtotal 4   Subtotal 4   Subtotal 4   Subtotal 5   Subtotal 5   Subtotal 6   Subtotal 6   Subtotal 6   Subtotal 7	-		R 2 565 515.
Sub Total 2  (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  Sub Total 3  (Subtotal 2 plus confingency)  14.0% of Subtotal 3	Sub Total 2  (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  (Subtotal 2 plus contingency)  14.0% of Subtotal 3	Sub Total 2 (Subtotal 1 plus sum of management & administrative items, 1 to 6 above) (Subtotal 1 Sub Total 3 Sub Total 3 Sub Total 3 Sub Total 3 (Subtotal 2 plus contingency)	Sub Total 2  (Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  (Subtotal 2 plus confingency)  14.0% of Subtotal 3			R 2 565 515.
(Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  Sub Total 3  (Subtotal 2 plus confingency)	(Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  Sub Total 3  (Subtotal 2 plus contingency)	(Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  Sub Total 3  (Subtotal 2 plus contingency)	(Subtotal 1 plus sum of management & administrative items, 1 to 6 above)  10.0% of Subtotal 1  Sub Total 3  (Subtotal 2 plus confingency)  14.0% of Subtotal 3		Sub To	
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(Subtotal 2 plus contingency)	(Subtotal 2 plus contingency)	(Sublatal 2 plus contingency)	(Subjoin 2 plus confingency)	11	Sub To	
14.0% of Subtotal 3	14.0% of Subtotal 3		14.0% of Subtotal 3		ubtotal 2 plus continge	
O INDICATE OF CONTRACT		14.0% of Subtotal 3		13		R 19 556 925.
					R 83 442 81 R 10 442 81 R 10 442 81 R 10 400 R 178 940 50 R 178 000 000 R 178 0000 R	R 83 442 81 1 1 1

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Template for "rules-based" approach of the quantum for financial provision

B 20 295 568 25			13	14.0% of Subtota			VAT	œ
R 144 968 344.62	Sub Total 3 (Subtotal 2 plus contingency)	(Subtotal 2 plu					A CONTRACTOR OF THE CONTRACTOR	
			3	10.0% of Subtota			Contingency	7
R 134 318 695.80	Sub Total 2	s administrative items	of management &	Subtotal 1 plus sum of management & adm	ls.		r man groundmater moderning	
R 2 662 412.21			Ξ	2.5% of Subtotal 1			bevelopment of a closure plan	5 57
R 2 129 929.76 R 2 662 412.21			==:	2.0% of Subtotal 1			Engineering drawings & specifications Engineering & procurement of specialist	1 2 4
R 13 977 664.08	1,05	Weighting factor 2 (step 4.4)		al 1	12.5% of Subtotal 1		Preliminary and general	۰ -
R 106 496 488.24	Sub Total 1 1 to 15 Above)	(Sum of items 1						
R 58 261.7			R 130.00	106.12	Main Substation Sub-Station/MCC	m <sub>2</sub> m <sub>2</sub>		
R 13 535.60 R 20 126.73			R 130.00	104.12 154.82	Weigh Bridge Diesel Storage/Refueling	200		
R 18 832.0			R 130.00	144.86	Waste Skip Area	38 0		
H 3 224 416.0		د مر	R 130.00	24 803.20	Solution Trench	100		
R 149 916.0			R 130.00	1 153.20	Silt Trap		Concrete Stabs & Light Structures	15 (C)
R 0.00		-	R 300 000.00	0.00	All Areas	NUS	Specialist study (Overall quantified risk assessment)	15 (B)
R 0.00	4		R 500 000.00	0.00	All Areas	_	Specialist study (Water pollution potential	15 (A)
R 8 908.			R 10 505.39	0.85	Processing Plant Area			
R 3 058 986.00	2 2		R 10 505.39	291.18	Evaporation Ponds	na na		
R 8 034.7	1		R 10 505.39	0.76	Administration	$\Gamma$		
R 20 057.9	-	4	R 10 505.39	1.91	Areas & Concrete Areas Reinforced Concrete Buildings			
R 4 269 060.3	1		R 30 015.40	142.23 402.66	Operational TSF, Surrounding	ha	2 to 3 years of maintenance & aftercare	4
R 23 676.1			H 30 015.40	0.79	Pollution Control Dam		Water management	13
R 0.0			R 78 940.50	0.00	N/A		River diversions (to be decommissioned)	5 =
R 10 369.5			R 78 940.50	9.01	Additional Concrete Areas Access Roads			
R 205 753.6	1		R 78 940.50	2.61	Concrete Areas	ha		
R 514 596.30			R 78 940.50	6.52	Mining Complex			
R 4 820 726,4			R 78 940.50	37.40 61.07	Surrounding Areas of TSF Topsoil Stockpiles		General surface rehabilitation	25.5
R 0.0	4		R 83 442.81	0.00	N/A	ha	Rehabilitation of subsided areas	9
H 0.0			H 360 484.95	0.00	N/A		deposits & evaporation ponds (acidic.	(C)
R 97 900.87	-4		R 124 113.68	0.7888	Pollution Control Dam			
R 61 804.0	1	4.4	R 124 113.68	0.50	Process Water Dam	ha	producing waste)	
H 4 866 993.			H 124 113.68	250.18	TSF - Basin		deposits & evaporation ponds (basic; salt	8 (8)
R 5 971 102.	. 1		R 99 651.13	59.92	Waste Dump 2			
R 5 656 833.	٠, ٠	2 2	R 76.54	56.77	Waste Dump 1	m <sup>3</sup>	Sealing of shafts, adits & inclines Rehabilitation of overburden & spoils	8 (A)
H 20 640 906.			H 145 124.46	142.23	Opencast Fit		voids & ramps	σ
R 1 858 807.9			R 285.15	6 518.79	Mining Complex	m².		
R 58 087.			R 285.15	203.71	Control Room			
R 16 780.8	4.	4	R 285.15	58.85	Tea Room			
R 160 064.02			R 285.15	561.34	Administration	m²	facilities	
R 22 589.2			R 285.15	79.22	Access Control & Security		Demolition of housing &/or administration	
R 0.00	4	-	R 135.07	0.00	N/A	m	Demolition & rehabilitation of non	
R 0.00		4.	R 247.63	0.00	N/A	-	Demolition & rehabilitation of electrified	4 (A)
R 488 548.5		200	R 25.51	19 148.94	Haul Roads	m²		
R 1 271 955.			R 25.51	14 531.47	Processing Plant Area		Henabilitation of access roads	u
R 3 424 119.88			R 210.11	16 296.97	Mining Complex	1 ~1		
H 23 778.7			R 210.11	557.45	Conveyor Belt Foundations	m <sub>2</sub> m <sub>4</sub>		
7 35 940.0			3 10	190.10	Crushing/Screening	1		
R 33 290.1			R 210.11	158.44	Screening Secondary Tertiary	m²		
H 433 721.7			H 210.11	2 064.28	Quatinary Separation	10		
R 272 027.2	-		R 210.11	1 294.70	Milling	m²		
R 182 619.8	1		R 210.11	859.17	Product Storage/Pumping Water Treatment			
H 269 676.7			R 210.11	1 283.52	Process Thickening	3, 3,		
R 19 974.1	-4		R 210.11	95.07	Sewage Plant		buildings & structures	(0)
R 513 617 97	4 4	2 2	R 142.57	2 444 55	N/A Workshop & Stores	m <sub>2</sub> m <sub>2</sub>	Demolition of steel buildings & structures  Demolition of reinforced concrete	2 (A)
					Thickening, Tailings Thickening, Process Water & Product Storage			
					Quatinary Crushing, Magnetic Separation, Milling, Process		power lines)	
R 925 984.4	_		R 10.24	90470.13	Secondary /Tertiary Crushing/Screening, Screening,	m <sup>3</sup>	Dismantling of processing plant & related structures (incl. overland conveyors &	æ
(Rands)	factor 1 Step 4.4	factor Step 4.3	Step 4.3	Slep 4.5	and the state of the formation of the state		TO ADD THE STORM OF THE COURT	
Amount	Weighting	Multiplication	Master rate	Quantity	Operational Area	Unit:	Description:	No.
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GRAND TOTAL

(Subtotal 3 plus VAT)

R 179 975 521 09

Escalation Factor

R 182 367 631.51

(Subtotal 3 plus VAT)

Step 4.3   Step 4.3   Step 4.4   1   Step 4.4   1   Step 4.4   1   Step 4.3   Step 4.4   1   Step 4.3   Step 4.4   1   Step 4.4   1   Step 4.3   Step 4.4   1   Step 4.4   Ste	<u> </u>		٧	80	υ	٥	E=A'B'C'D
Committee Secretaring	E EEEEEEE	Operational Area	Quantity	Master rate	Multiplication	Weighting factor 1	Amount (Rands)
The control of the	2 2 2 2 2 2 2	rry Tertiary y/Screening, Screening, y Crushing, Magnetic on, Milling, Process ng, Tailings Trickening, Water & Product Storage	90470.13	R10.24	Step 4.3	Slep 4.4	R 925 984.49
A	m² Sewaga m² Tailing m² Proces m² Produ m² Water m² Willing	Sione	0.00			-	R 0.00
Marcola University	Proces Produc Water Milling	Plant	95.07	П			R 19 974.
The control of the	Water Willing	Thickening	1 283.52	Ш		-	R 269 676.
Mail	Milling	Storage/Pumping reatment	143.21				R 30 089.
The control of the	-		1 294.70	П		-	R 272 027.3
The control of the	Quatin	y Separation	633.77				R 133 160.
The control of the		og Tarlian	158.44				R 33 290.
The contraction of the contrac		/Screening	0.00				010
This control of the		Control Dam	113.17	R 210.11			H 23 778.
March   196		Complex	16 296.97	R 210.11		-	R 3 424 119.
March   Marc	access roads m²	a Black Area	49 855.00	R 25.51			R 1 271 955.
The control of the		ads	19 148.94	R 25.51		1	R 488 548.
MACONSTITUTION   MACO	electrified m	Complex	6.518.79	R 247 63			R 166 314,
NA							
Marcas Control & Security   779 22 R 2855 15   1   1   1   1   1   1   1   1	ш		0.00	R 135.07		•	В.
The Change House	dministration m <sup>2</sup>	Control & Security	79.22	R 285.15		-	R 22 589.
Marcia Charles (Appen)   28 85   R 2855; 5   1   1   1   1   1   1   1   1   1	T	House	117.70	R 285.15			R 33 561.
The control of the	П	E	58.85	R 285,15		-	R 16 780.
Mining Complex   6 518   7 14 24 46   1   1   1   1   1   1   1   1   1		Room	108.65	H 285.15			R 30 980.
NA   NA   NA   NA   NA   NA   NA   NA	a <sub>2</sub>	Complex	6.518.79	R 285.15		-	R 1 858 807.
MA   Wase Dump   29.00   R 76.64   1   1   1	ha	st Pit	198.69	R 145 124.46		-	R 28 834 198.
Main Subcomp 1   79 837   R 1996 561.13   1   1   1   1   1   1   1   1   1	°E		00.0	R 76.54		-	RO.
Name	ha	ump 1	79.30	R 99 651.13			R 7 902 281.
Page	ha	RWD	39.21	R 124 113.68			R 4 866 993.
This	salt ha	isin	250.4225	R 124 113.68		-	R 31 080 857.
Page   Politician Control Darm   0.7888   R 124 115.68   1   1   1   1   1   1   1   1   1	ha	Her Dam	0.50	R 124 113.68		-	R 61 804.
NA   NA   NA   NA   NA   NA   NA   NA	ha	Control Dam	0.7888	R 124 113.68			R 97 900.
Packers   Pack	ha		00.00	R 360 484.95		-	H O.
The Number of Section   The							
Page   Controlled February   Controlled Fe	an t	dio Arese of TCF	0.00	R 83 442.81	5 (5	-	.0 E
Name   Additional Complex   E.S.   R.78 940.90   1   1   1	ha	Stockpiles	68.04	R 78 940 50		-	R 5 371 299.
The Concess Continues on the Concess Annual Concrete Areas		Somplex	6.52	R 78 940.50		1	R 514 596.
The control of the commission of the commissio	Ŏ (	tion Admin & Laydown	30.78	R 78 940.50	72	-	R 2 430 038.
The following contacts (to be decommissioned)   The following contacts (to be decomply contacts)   The following contacts (to be decomplant)   The following contacts (to be decomply contacts)   The f	5 A	al Concrete Areas	0.13	R 78 940.50			R 10 369
The control	ha	Roads	9.01	R 78 940.50	7-	-	R 710 892.
The control of the	e decommissioned) ha N//		0.00	R 78 940.50		-	RO.
The control of control	E E	ng Plant Area	3 051.37	R 30 015 40			R 23 676
3 years of maintenance & attencare   ha   Development TSF Surrounding   402.90   R 10.505.39   1   1   1   1   1   1   1   1   1	ha	St Pit	198.69	R 30 015.40		-	R 5 963 639.
Authority   Auth	sintenance & aftercare ha		402.90	R 10 505.39	-	-	R 4 232 656.
The Administration   The Administration   0.75   R 10 505.39   1   1   1   1   1   1   1   1   1		Concrete Areas ed Concrete Buildings	1.91	R 10 505.39		-	R 20 057.
Page   Coverburden & Spoils   153.00   R 10.05.39   1   1   1   1   1   1   1   1   1		ration	0.76	R 10 505.39		-	R 8 034.
The Expansion Professor   The Expansion Pr		den & Spoils	163.00	R 10 505.39		1	R 1 712 425.
The angle of the pollution potential   SuM		tion Ponds	291.42	R 10 505.39		-	R 3 061 493.
Similar study (Water pollution potential SUM All Areas 0.00 R 300 00.00 R 30		Surface Rehabilitation	154.49	R 10 505.39			R 1 622 951.
Substitution   Subs	ial SUM		0.00	R 500 000.00		-	RO
Signature	1110		000	00 000 000 0			0
The Final Structures	NOS		0.00	H 300 000.00			0
The Property of Part 1	os & Light Structures m²		1 153.20	R 130.00		-	R 149 916.
Marie Skip Area   14.86   R 130.00   1   1   1   1   1   1   1   1   1		Dissipator	108.00	R 130.00			R 14 040.
The control of the		er Pad	355.50	R 130.00		-	R 46 215.
Main Supering		kip Area	144.86	R 130.00		1	R 18 832.0
Main Sub-Station MOC		ridge	104.12	R 130.00		-	R 13 535.
The control of the		bstation	448.17	R 130.00		-	R 58 261.
Supervision costs   12.5% of Subtotal 1   Weighting factor 2   1.05		tion/MCC	106.12	R 130.00		1	R 13 795.
12.5% of Subtotal 1					(Sum of Items	Sub Total 1	R 122 145 075.
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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 buric 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 L 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 spreadout 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 spac' 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.

## APPENDIX W: CLIMATIC WATER BALANCE

Specialist report prepared by Metago, June 2011





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20 May 2011

Project Reference: T020-02

Moonlight Iron Ore

# PRELIMINARY WATER BALANCE FOR THE PROPOSED MOONLIGHT IRON ORE PROJECT

#### 1. INTRODUCTION

This report documents the preliminary site wide monthly climatic water balance for the proposed Moonlight Iron Ore Project.

The preliminary water balance model covers water consumption and reticulation of the following components of the project:

- Rainfall and storm water runoff,
- · Open pit mining operations (underground fissure water),
- Storm water dams (seepage and evaporative losses).
- Plant operations (various plant water losses and water losses in the discard material), and
- Tailings storage facility (interstitial lock up in tailings and seepage losses).

The preliminary water balance model presented represents long term averaged flows rather than instantaneous or peak flow rates. The purpose of the report is to establish a preliminary site wide water balance from an environmental and overall water use perspective. To this end, the water balance makes a number of simplifying assumptions and is not intended for use in sizing and detailed design of individual flow lines.

## 2. METHODOLOGY

Since the Moonlight Project area is particularly water scarce, and hence the water demand of the mine critical, both the conservative tailings tonnage (355,550 dry tonnes per month (tpm) and the anticipated tailings tonnage (274,260 dry tpm) have been assessed.





The preliminary water balance model emphasises the following water use protocol: prevent pollution, recycle/reuse of all the process water, treat water where required, and no planned discharge.

## 3. CLIMATIC DATA

The climatic data used in the preliminary monthly water balance is given below:

	Marnitz Weathe	r Station (A5E001)
Month	Average Rainfall Depth (mm)	Average Lake Evaporation (mm)
January	84.5	177.4
February	67.5	142.1
March	45.6	149.7
April	34.6	115.2
May	6.9	96.2
June	3.2	78.4
July	1.4	89.8
August	2.7	120.4
September	10.4	155.3
October	33.4	184.4
November	62.5	178.4
December	66.7	166.2
TOTAL	419.4	1653.6
Month	Average Rainfall Depth (mm)	Average Lake Evaporation (mm)
Average (Mar to Apr) & (Sep to Oct)	31.0	151.2
Wet Season (Nov to Feb)	70.3	166.0
Dry Season (May to Aug)	3.6	96.2

## 4. OPEN PIT DATA

Seepage into the open pit has conservatively been estimated at 350 m³ per day (or 10,500 m³ per month) based on the hydrogeological investigation (see *Hydrogeological Investigation and Impact Assessment for the Proposed Mining Activities – Moonlight Iron Ore Project*, Metago Water Geosciences, Report 001/0132, May 2011).

Seepage losses from the open pit, as well as, evaporative losses are assumed to be zero and/or negligable.

Storm water falling (and hence captured) on the open pit area has been included in the overall storm water runoff that is channelled to both the South and Central storm water dams.

## 5. STORM WATER DAMS DATA

Two unlined storm water dams (Central and South) have been provided for at the proposed Moonlight Iron Ore Project. The storm water data used in the preliminary water balance is presented below:

Facility	Information Used
APPROVINCE A MODELLA	Total catchment area = Approximately 3,137,915 m² (with 30% runoff)
	Central SWD area = Approximately 138,400 m² (with 100% runoff)
	Evaporation water losses = 7,303 m³ / month (during average months)
	= 22,908 m <sup>3</sup> / month (during wet months)
Central Storm	= 1,328 m <sup>3</sup> / month (during dry months)
Water Dam	Seepage water losses = 1,256 m³ / month (during average months, Central SWD)
(Central SWD)	storing some water)
	= 3,588 m <sup>3</sup> / month (during wet months, Central SWD
	storing significant amount of water)
	= 359 m <sup>3</sup> / month (during dry months, Central SWD mainly
	empty)
	Total catchment area = Approximately 3,583,300 m² (with 30% runoff)
	Central SWD area = Approximately 158,300 m² (with 100% runoff)
	Evaporation water losses = 8,350 m³ / month (during average months)
	= 26,195 m <sup>3</sup> / month (during wet months)
South Storm	= 1,518 m <sup>3</sup> / month (during dry months)
Water Dam	Seepage water losses = 1,436 m³ / month (during average months, Central SWD)
(South SWD)	storing some water)
	= 4,103 m <sup>3</sup> / month (during wet months, Central SWD
	storing significant amount of water)
	= 410 m <sup>3</sup> / month (during dry months, Central SWD mainly
	empty)

## 6. PLANT DATA

Discard water losses (i.e. water retained with the discard) have been estimated to be 425  $m^3$ /month (5,100  $m^3$ /year).

Other plant water losses (mainly as evaporation from the thickener, losses associated with concentrate pumping and water used for dust suppression) have been estimated to be 1,255 m $^3$ /month (15,060 m $^3$ /year).

Both the conservative tailings tonnage (355,550 dry tonnes per month (tpm) and the anticipated tailings tonnage (274,260 dry tpm) have been assessed in the preliminary water balance model.

The tailings will be pumped to the TSF at a slurry density of approximately 1.71 tonnes per m³, which equates to 55 % solids by mass at a particle specific gravity of 4.1. Therefore, for a tailings delivery of 355,500 dry tpm, the water delivery equates to roughly 291,874 m³ per month. Similarly, for a tailings delivery of 274,260 dry tpm, the water delivery equates to roughly 225,174 m³ per month.

## 7. TSF DATA

The tailings storage facility (TSF) data, for 355,500 tpm tailings, used in the preliminary water balance is presented below:

Facility	Information Used
	Total catchment area = 2,343,815 m² (LOM basin) and 629,712 m² (LOM slopes).
	Supernatant pool area = 500,952 m² (with 100% runoff)
Tailings	<ul> <li>Dry tailings area = 1,523,480 m² (with 50% average runoff)</li> </ul>
Storage	<ul> <li>Wet tailings area = 319,368 m² (with 100% average runoff)</li> </ul>
Facility (TSF)	Evaporation water losses = 127,754 m³ / month (during average months)
	= 140,259 m <sup>3</sup> / month (during wet months)
For 355,500	= 81,283 m <sup>3</sup> / month (during dry months)
tpm tailings	Seepage water losses = 4,500 m³ / month
	• Interstitial lock-up water losses = 91,043 m³ / month (or 31% of total incoming
	slurry water)
	Total catchment area = 1,718,127 m²
Return Water	<ul> <li>RWD/SWD area = 329,945 m<sup>2</sup> (with 100% runoff)</li> </ul>
DAMEST SANOT MAN DESCRIPTION OF THE PARTY OF	Veld, road servitude and TSF paddocks etc. = 1,388,182 m² (with 30% runoff)
Dam (RWD) &	<ul> <li>Evaporation water losses = 28,270 m³ / month (during average months)</li> </ul>
Storm water	= 54,771 m <sup>3</sup> / month (during wet months)
Dam (SWD)	= 12,696 m <sup>3</sup> / month (during dry months)
Dain (OVD)	Seepage water losses = 2,102 m³ / month (during average months, SWD storing)
For 355,500	some water)
tpm tailings	= 5,749 m <sup>3</sup> / month (during wet months, SWD storing
	significant amount of water)
	= 575 m <sup>3</sup> / month (during dry months, SWD mainly empty)