CONSOLIDATED FINANCIAL PROVISIONING REPORT

May 2019

WEST WITS MINING PROJECT

DMR Reference Number:
GP 30/5/1/2/2 (10073) MR

REGISTRATION NUMBER 2018/343416/07
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MELETT
Environmental Strategic Advisors

FINANCIAL PROVISIONING REPORT

FOR

WEST WITS MINING:

May 2019

in respect of the

WEST WITS MINING PROJECT

REF:

DMR Reference Number:
GP 30/5/1/2/2 (10073) MR

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ABBREVIATIONS

Abbreviation	Description
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
ECA	Environmental Conservation Act (Act 73 of 1989)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Assessment Report
EMPR	Environmental Management Programme
GNR	Government Notice Regulation
GN 1147	Government Notice 1147
I&APs	Interested and Affected Parties
LOM	Life of Mine
MPRDA	Mineral and Petroleum Resources Development Act (Act 28 of 2002)
MRA	Mining Right Application
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMWA	National Environmental Management: Waste Act (Act 59 of 2008)
NHRA	National Heritage Resources Act (Act 25 of 1999)
NWA	National Water Act (Act 36 of 1998)
PCD	Pollution Control Dam
ROM	Run of Mine
RVI	Riparian Vegetation Index
RWD	Return Water Dam
SABS	South African Bureau of Standards
SANS	South African National Standard
SHERQ	Safety, Health, Environmental, Risk and Quality

EXECUTIVE SUMMARY

Introduction

West Wits is proposing to establish a mining operation in an area located south of Roodepoort and to the north of Soweto in the City of Johannesburg Metropolitan Municipality, Gauteng. West Wits has applied for a mining right in terms of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002) (MPRDA) as amended, for gold, uranium and silver over various portions of the farms Roodepoort 236 IQ, Roodepoort 237 IQ, Tshekisho 710 IQ, Uitval 677 IQ, Vlakfontein 238 IQ, Vogelstruisfontein 231 IQ, Vogelstruisfontein 233 IQ, Witpoortjie 245 IQ ('the project'). The R24 (Albertina Sisulu/Hamberg) provincial road runs along the northern boundary of the project area.

The proposed project would involve the development of five (5) open pit mining areas (referred to as the Mona Lisa Bird Reef Pit, Roodepoort Main Reef Pit, Rugby Club Main Reef Pit, 11 Shaft Main Reef Pit and Kimberley Reef East Pit on **Figure 1**) and refurbishment of two (2) existing infrastructure complexes (referred to as the Bird Reef Central Infrastructure Complex and Kimberley Reef East Infrastructure Complex on **Figure 1**) to access the existing underground mine workings.

The project would also include the establishment of run of mine (ROM) ore stockpiles, topsoil stockpiles and waste rock dumps as well as supporting infrastructure including material storage and handling facilities (for fuel, lubricants, general and hazardous substances), general and hazardous waste management facilities, sewage management facilities, water management infrastructure, communication and lighting facilities, centralised and satellite offices, workshops, wash bays, stores, change houses, lamp rooms, vent fans and security facilities.

Legal Framework

This financial provision update has been prepared in accordance with GNR 1147 of the National Environmental Management Act (107/1998): *Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations*, published 20 November 2015 (Financial Provisioning Regulations, 2015), as amended.

An applicate must determine the financial provision through a detailed itemisation of all activities and costs, calculated on the actual costs of implementation of the measures required for –

a) *Annual rehabilitation, as per Appendix 3 of the above-mentioned regulations*

b) *Final rehabilitation, decommissioning and closure of the mining or production operations at the end of life of the operations, as per Appendix 4 of the above-mentioned regulations*

c) *Remediation of latent or residual environmental impacts which may become known in the future, as per Appendix 5 of the above-mentioned regulations*

Relevance of the respective sections to the Legal Framework

GNR 1147	Appendix 3	Relevant section in the report
Annual Rehabilitation Report		
3(a)-(g)	The annual rehabilitation plan will be relevant for a period of 1 year, after which the plan will be updated by the holder of a right or permit to reflect progress relating to rehabilitation and remediation activities in the preceding 12 months and to establish a plan, schedule and budget for the forthcoming 12 months. This must relate to the operations closure vision, clearly indicating what closure objective and criteria are being achieved through implementation. This must be measurable and auditable.	Refer to **Annexure A, Part B,** page 25 to 29. The annual rehabilitation plan has been prepared for the proposed activities in Year 1. This will be updated annually.
GNR 1147	**Appendix 4**	**Relevant section in the report**
Closure Plan		
3(a)	Details of the specialists	Refer to **page iii** of this report for the specialists that undertook the costing estimates for the opencast pits and the vertical shafts. Refer to **Part A, section 1.4** of the EIA/EMP for the list of specialists that identified potential impacts & risks.
3(b)(i)	Material information	Information was sourced from all the specialist studies undertaken as part of the EIA/EMP regulatory process. Also refer **page 3** of this report.
3(b)(ii)	Environmental and social context	Refer to **section 5 & 6** of the EIA/EMP and **section 20**
3(b)(iii)	Stakeholder issues and comments	Refer to **section 6.2 and 6.3** of the EIA/EMP.
3(b)(iv)	Mining plan and schedule	Refer to **section 3.2** of the EIA/EMP, it is also dealt with in the **Annexure A**. Reference is also made to the summary estimated in **Table 1** below, the proposed order of the mining activities has been included.
3(c)(i)	Risk assessment methodology	Refer to **section 6.6**, of the EIA/EMP
3(c)(ii)	Identification of indicators	Refer to **section 6.7, section 7 and section 8** of the EIA/EMP
3(c)(iii)	Strategies to manage/mitigate risks	Refer to **section 7,4, section 25, section 26** and **section 27** of the EIA/EMP
3(c)(iv)	Reassessment of risks	Refer to **section 27**

3(c)(v)	Changes to risk assessment results	No changes deemed necessary at this point because the project has not yet commenced. Therefore, annual audits on the level of accuracy and mitigation will be undertaken
3(d)(i)	Legal and governance framework	Refer to **pg. 3 of this report** and **section 4**, of the EIA/EMP
3(d)(ii)	Closure vision and objectives	Refer to **section 25**, of the EIA/EMP
3(d)(iii)	Evaluation of alternatives	Alternatives were considered with the respective landowners, refer to **section 6.5** of the EIA/EMP
3(d)(iv)	Motivation for closure option	Closure objectives are in line with each respective landowner
3(d)(v)	Motivation for closure period	Closure timeframes of each open cast pit has been motivated in the **Annexure A.** The closure period of the decommissioning and rehabilitation of the vertical shaft infrastructure will be up to3-5 years post completion of mining.
3(d)(vi)	Details of ongoing research	Synergies will be aligned with surrounding prospecting and mining right holders. In addition, monthly water quality and air quality monitoring will be undertaken during operations and annual updates on various specialist and / or reporting will be in line with the various license conditions received.
3(d)(vii)	Assumptions made for closure	All opencast pits will be rehabilitated as indicated in **Annexure A,** all surface infrastructure at the vertical shafts that is not considered protected under the Heritage Act will be decommissioned and rehabilitated in line with the landowner land use requirements.
3(e)(i)	Post-mining land use	Post mining land-use is in line with the post mining land use objectives of the respective landowners.
3(e)(ii)	Map of post mining land use	Proposed township and / or development layouts are being finalised with the landowners. This has been depicted in the EIA/EMP, refer to the Figure illustrating Planned development in the proposed Mining Right Area.
3(f)(i)	Specific technical solutions	Refer to **section 25** of the EIA/EMP.
3(f)(ii)	Threats and uncertainties	Refer to **section 14** of the EIA/EMP.
3(g)(i)&(iii)	Schedule of actions	Refer to **section 27** of the EIA/EMP
3(g)(ii)	Assumptions and drivers	Refer to **section 14** and to **Annexure C**
3(h)(i)-(iii)	Organisational capacity and structure	As per proposed employment organogram

3(i)	Indication of gaps	Refer to **section 14** and to **Annexure C**
3(j)	Relinquishment criteria	Not applicable
3(k)(i)	Closure cost estimate & accuracy	This will be audited annually to improve accuracy
3(k)(ii)	Closure cost estimate methodology	Refer to **Annexure A & B** and to summary of total costs on page 5 of this report.
3(k)(iii)	Annual updates	No annual updates have yet been undertaken because the MR has not been granted
GNR 1147	**Relevant section in the report**	
Appendix 3, 4 and 5		
3(l)(i) - (iii) & 3 (e)	Monitoring, auditing and reporting	This will be in line with all license conditions and applicable legislation
3(m)	Amendments to the closure plan	No amendments are deemed necessary now however I&APs comments still require to be considered as part of the next Public Participation Process.
GNR 1147	**Appendix 5**	**Relevant section in the report**
Environmental Risk Assessment		
3 (a)	Details of the specialists	Refer to **section 1** of the EIA/EMP
3 (b)(i)	Risk assessment methodology	Refer to **Table 6.11**, in **section 6.6** of the EIA/EMP
3 (b)(ii)	Latent risk substantiation	See **Annexure C**
3 (b)(iii)	Risk drivers	See **Annexure C**
3 (b)(iv)	Expected timeframe	No latent risks yet quantified, ongoing monitoring will assist with the quantification hereof and this will be addressed and included as part of the annual updates
3 (b)(v)	Risk triggers	No latent risks yet quantified, ongoing monitoring will assist with the quantification hereof and this will be addressed as part of the annual updates
3 (b)(vi)	Risk assessment results	Refer to **Annexure C**
3 (b)(vii)	Changes to risk assessment results	None required at this point in the process
3 (c)(i)	Monitoring to inform management	Management will form part of the implementation planning
3 (c)(ii)-(iv)	Alternative mitigation measures following impacts	None yet identified
3 (d)(i)-(iii)	Cost estimation and accuracy	This will be accessed in the annual update, refer to summary cost in **Table 1**, below

Information sourced

1. Electronic files (DXF) files. Bara Consulting (Bara, 2018) and Shango Solutions (Shango, 2018);
2. Electronic files (DXF) containing the survey contours for the MRA. (Kirschoff professional surveyors, 2018);
3. West Wits opencast sequence (SLR consulting, 2019);

4. Conceptual post mining landform and initial volumetric assessment for costing purposes, inclusive of the Annual Rehabilitation plan (Golder, 2019), refer to **Annexure A**;
5. Bill of Quantities undertaken by a Quantity surveyor for current site clearance calculations and for proposed surface infrastructure dismantling and demolishment (EPCM, 2018), refer to **Annexure B** (due to date of the report CPI of 6% has been added to the consolidated summary table); and
6. The consolidated environmental risk assessment undertaken in order to determine latent impact calculations and assumptions (RS Mellett (Pty) Ltd), refer to **Annexure C**

Limitations

- Reference is made to **section 14 of the EIA/EMP**, for limitations
- Reference is made to **Annexure A**, appendix D outlines the document limitations
- Reference is made **Annexure B**, the report was completed in April 2018, therefore for purposes of this consolidated report, an escalation of 6% has been applied to the final numbers.

Assumptions & Exclusions

- Reference is made to **section 14 of the EIA/EMP**, for list of assumptions made
- Reference is made to **Annexure B**, refer to page 5 & 6 for list of assumptions and exclusions
- Reference is made to **Annexure C,** the assumptions about the timing of potential latent impacts have been outlined in **Table 1.**

Financial Provision consolidation

This report provides a consolidated closure cost estimate for the two (2) existing vertical shaft infrastructure facilities, the refurbishment of the shaft areas and the five (5) proposed opencast pits (refer to Annexure A: Preliminary Rehabilitation and Closure Planning and Costing for the five proposed opencast pits for inclusion in the West Wits Mining Right Application

Based on the estimated rehabilitation and closure costs outlined in this consolidated document, the updated financial provision is calculated at:

- Consolidated liability of the 30-year period: **R 49 280 562,40**
- LoM closure liability: **R 7 261 112,30** (including VAT)

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ANNEXURE B: Bill of Quantities undertaken by a Quantity surveyor for current site clearance calculations and for proposed surface infrastructure dismantling and demolishment (EPCM, 2019),

ANNEXURE C: The consolidated environmental risk assessment undertaken in order to determine latent impact calculations and assumptions (RS Mellett (Pty) Ltd).

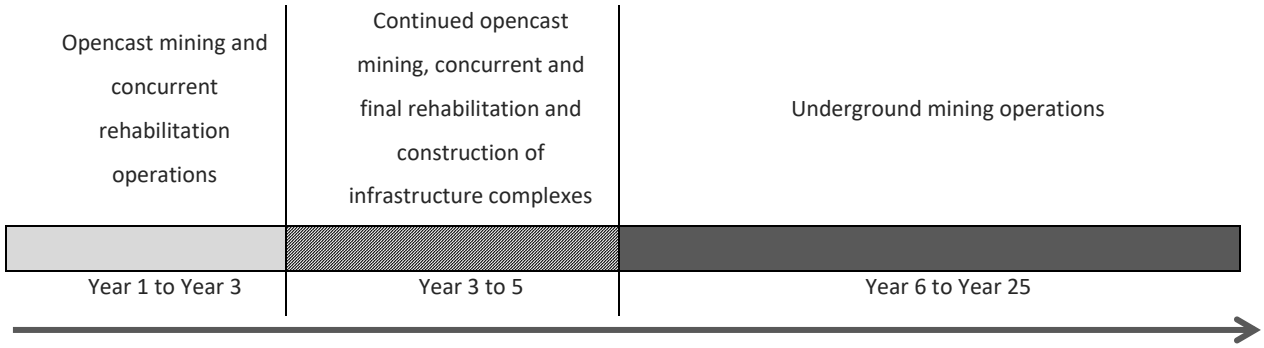
1. INTRODUCTION

West Wits is proposing to establish a mining operation in an area located south of Roodepoort and to the north of Soweto in the City of Johannesburg Metropolitan Municipality, Gauteng. West Wits has applied for a mining right in terms of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002) (MPRDA) as amended, for gold, uranium and silver over various portions of the farms Roodepoort 236 IQ, Roodepoort 237 IQ, Tshekisho 710 IQ, Uitval 677 IQ, Vlakfontein 238 IQ, Vogelstruisfontein 231 IQ, Vogelstruisfontein 233 IQ, Witpoortjie 245 IQ ('the project'). The R24 (Albertina Sisulu/Hamberg) provincial road runs along the northern boundary of the project area.

West Wits currently holds a prospecting right (GP 30/5/1/1/2/10035 PR) over the above farms. The prospecting right (MPT No. 29/2016) was ceded from Mintails SA Soweto Cluster (Proprietary) Limited to West Wits. Consent for the transfer of the prospecting right in terms of Section 11(2) of the MPRDA was granted by the DMR in 2018.

In broad terms the proposed project would involve the development of five open pit mining areas (referred to as the Mona Lisa Bird Reef Pit, Roodepoort Main Reef Pit, Rugby Club Main Reef Pit, 11 Shaft Main Reef Pit and Kimberley Reef East Pit on Figure 1) and refurbishment of two existing infrastructure complexes (referred to as the Bird Reef Central Infrastructure Complex and Kimberley Reef East Infrastructure Complex on Figure 1) to access the existing underground mine workings. The project would also include the establishment of run of mine (ROM) ore stockpiles, topsoil stockpiles and waste rock dumps as well as supporting infrastructure including material storage and handling facilities (for fuel, lubricants, general and hazardous substances), general and hazardous waste management facilities, sewage management facilities, water management infrastructure, communication and lighting facilities, centralised and satellite offices, workshops, wash bays, stores, change houses, lamp rooms, vent fans and security facilities.

The expected life of mine for the open pit operations (inclusive of rehabilitation) is five (5) years and 20 years for the underground operations (see diagram below). The pits would be mined in a phased approach with each pit taking between six and 16 months to be mined and rehabilitated.



The final post closure land uses have been identified in consultation with land owners and will include residential, commercial, industrial, infrastructure, and wilderness.

Prior to the commencement of the project, an EIA regulatory process must be conducted in terms of the MPRDA, National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA) and the National Environmental Management: Waste Act, 2008 (No. 59 of 2008) (NEM:WA), all as amended.

SLR Consulting (South Africa) (Pty) Ltd (SLR) has been appointed as the independent environmental assessment practitioner (EAP) responsible for undertaking the EIA for the project. RS Mellett (Pty) Ltd (hereafter referred to as RSM) has been appointed by West Wits (MLI) (Pty) Ltd to consolidate the cost estimations undertaken by Golder and EPCM for the proposed project that involves the development of five (5) open pit mining areas (referred to as the Mona Lisa Bird Reef Pit, Roodepoort Main Reef Pit, Rugby Club Main Reef Pit, 11 Shaft Main Reef Pit and Kimberley Reef East Pit on **Figure 1**) and refurbishment of two (2) existing infrastructure complexes (referred to as the Bird Reef Central Infrastructure Complex and Kimberley Reef East Infrastructure Complex on **Figure 1**) to access the existing underground mine workings. RSM have further summarised all risks identified by the independent EAP and specialists in one consolidated risk assessment and consolidated the list of potential latent impacts and assumptions.

2. LEGAL FRAMEWORK

This financial provision update has been prepared in accordance with GNR 1147 of the National Environmental Management Act (107/1998): *Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations*, published 20 November 2015 (Financial Provisioning Regulations, 2015), as amended.

An applicate must determine the financial provision through a detailed itemisation of all activities and costs, calculated on the actual costs of implementation of the measures required for –

a) *Annual rehabilitation, as per Appendix 3 of the above-mentioned regulations. Refer to* ***Part B of Annexure A.***
b) *Final rehabilitation, decommissioning and closure of the mining or production operations at the end of life of the operations, as per Appendix 4 of the above-mentioned regulations. Refer to* ***Annexure A & Annexure B***
c) *Remediation of latent or residual environmental impacts which may become known in the future, as per Appendix 5 of the above-mentioned regulations. Refer to* ***Annexure C.***

3. INFORMATION SOURCED

- Electronic files (DXF) files. Bara Consulting (Bara, 2018) and Shango Solutions (Shango, 2018);
- Electronic files (DXF) containing the survey contours for the MRA. (Kirschoff professional surveyors, 2018);
- West Wits opencast sequence (SLR consulting, 2019);
- Conceptual post mining landform and initial volumetric assessment for costing purposes, inclusive of the Annual Rehabilitation plan (Golder, 2018), refer to **Annexure A**;
- Bill of Quantities undertaken by a Quantity surveyor for current site clearance calculations and for proposed surface infrastructure dismantling and demolishment (EPCM, 2018), refer to **Annexure B** (note not all infrastructure has been accounted for to decommission, due to its Heritage value and the protection thereof); and
- The consolidated environmental risk assessment undertaken in order to determine latent impact calculations and assumptions (RS Mellett (Pty) Ltd), refer to **Annexure C**

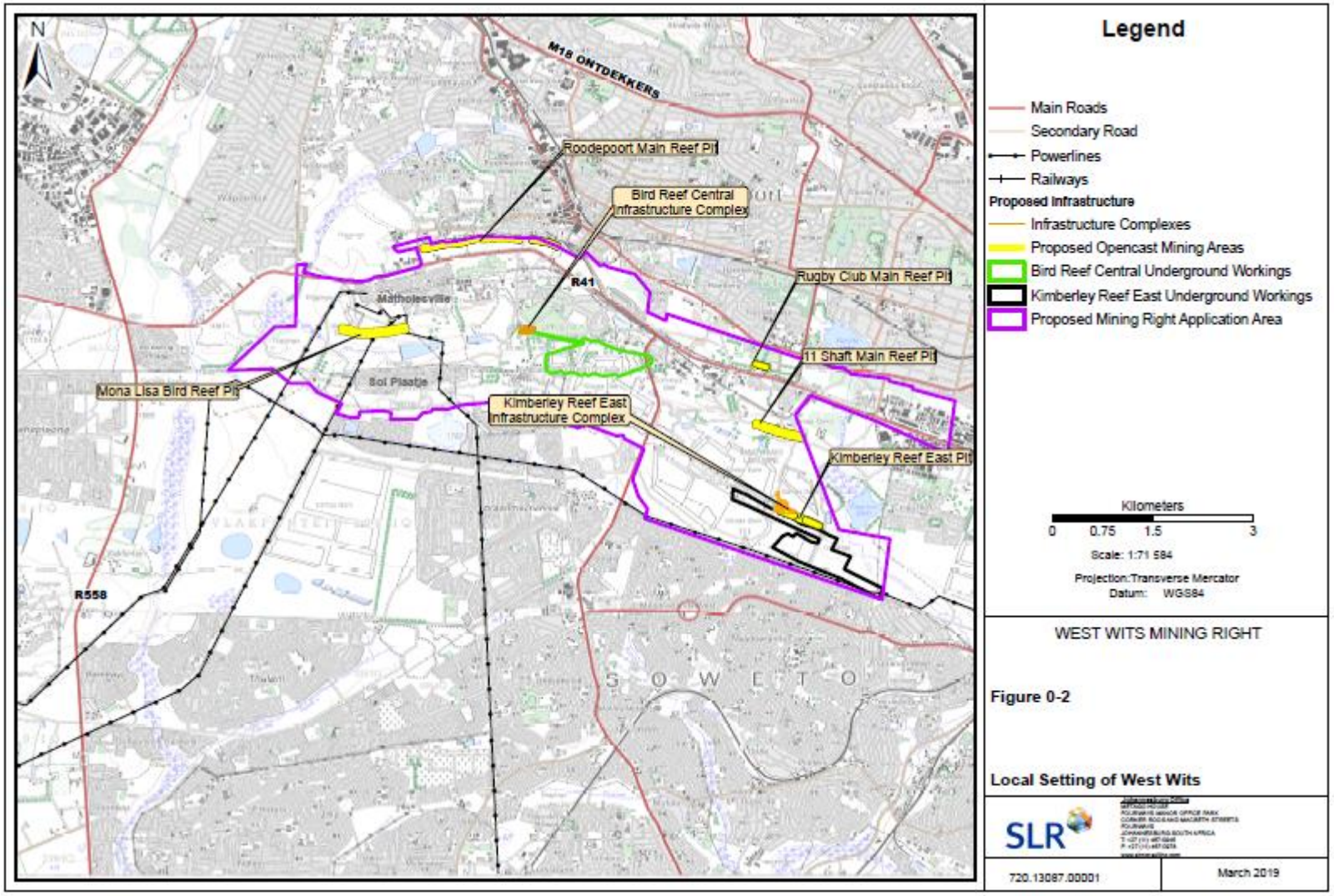


Figure 1. *Local setting of the five (5) proposed opencast pits and the two (2) vertical shafts*

4. ASSUMPTIONS & LIMITATIONS

Limitations

- Reference is made to **Annexure A**, appendix D outlines the document limitations
- Reference is made **Annexure B**, the report was completed in April 2018, therefore for purposes of this consolidated report, an escalation of 6% has been applied to the final numbers.

Assumptions & Exclusions

- Reference is made to **Annexure B**, refer to page 5 & 6 for list of assumptions and exclusions
- Reference is made to **Annexure C,** the assumptions about the timing of potential latent impacts have been outlined in **Table 1.**

5. FINANCIAL PROVISION CONSOLIDATION

This report provides a consolidated summary of the closure cost estimate for the two (2) existing vertical shaft infrastructure facilities, the refurbishment of the shaft areas and the five (5) proposed opencast pits, as calculated by Golder and EPCM in **Annexure A** and **Annexure B**, herewith attached.

Table 1. Consolidated Financial Provisioning

CONSOLIDATED FINANCIAL PROVISION QUANTUM

Applicant: **West Wits (MLI) (Pty) Ltd**
Evaluators: **Gus Calder, Anthony Lamb & Robyn Mellett**

No.	Description Totals include P&G's & Contingencies	Year Rehab starts	A Golder	B EPCM Proposed Infrastructure	B EPCM Existing infrastructure	C Risk Assessment Latent Impacts	D Premature closure cost (Rands)	E=A*B*C*D LOM / Latent closure cost (Rands)
1	Roodepoort	1	R7 297 741,43				R7 297 742,43	R0,00
2	Rugby Club	1	R967 003,03				R967 004,03	R0,00
3	Mona Lisa Pit	2	R5 565 148,88				R5 565 150,88	R0,00
4	11 Shaft Pit	2	R4 477 474,50				R4 477 476,50	R0,00
5	Kimberley East Pit	3	R1 451 153,86				R1 451 156,86	R0,00
6	Kimberley Reef East Infrastructure Complex	15		R7 215 545,22	R2 489 936,54		R9 705 481,76	R0,00
7	Bird Reef Central Infrastructure Complex	25		R12 555 437,64	R3 761 112,30		R16 316 549,94	R3 761 112,30
3- 5 years	Care & Maitenance	Sum				R2 000 000,00	R2 000 000,00	R2 000 000,00
3 - 5 years	Monitoring post mining	Sum				R1 500 000,00	R1 500 000,00	R1 500 000,00
							R49 280 562,40	**R7 261 112,30**

Based on the estimated rehabilitation and closure costs outlined in this consolidated document, the estimated financial provision required is as follows:

- Consolidated liability of the 30-year period: **R 49 280 562,40**
- LoM / Latent closure liability (estimated liability post completion of rehabilitation): **R 7 261 112,30** (including VAT)

REPORT

Preliminary Rehabilitation and Closure Planning and Costing for the five proposed opencast pits for inclusion in the West Wits Mining Right Application

Malan Scholes Consulting (Pty) Ltd

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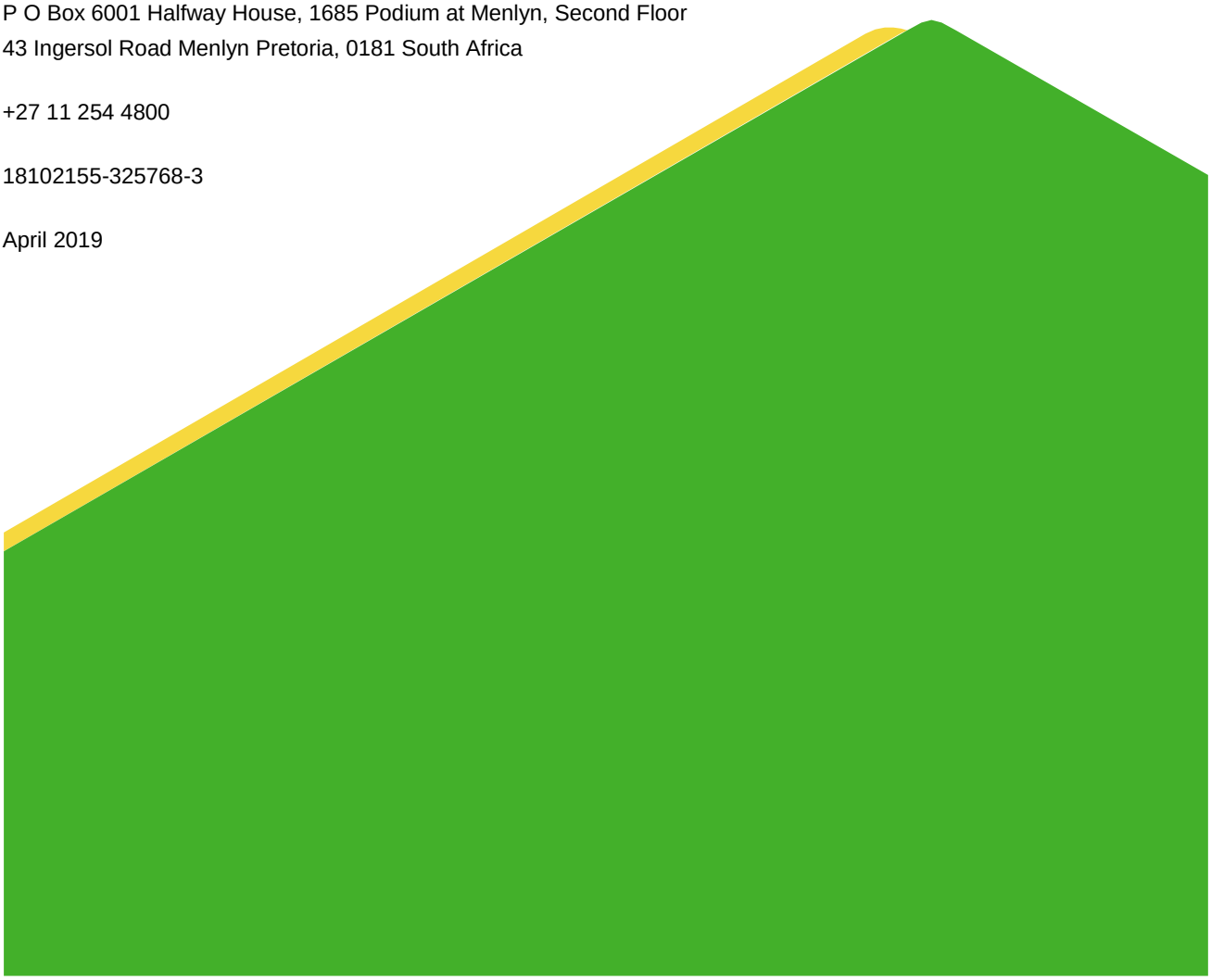

Distribution List

1 x Malan Scholes Consulting

1 x West Wits Mining MLI (Pty) Ltd

1 x Projectreports@golder.com

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1.0 INTRODUCTION

West Wits Mining MLI (Pty) Ltd (West Wits) is the holder of prospecting right (GP 30/5/1/1/2/10035 PR) on various portions of the farms Roodepoort 236 IQ, Roodepoort 237 IQ, Witpootjie 245 IQ, Vlakfontein 238 IQ, Vogelstruisfontein 231 IQ, Volgelstruisfontein 233 IQ and Doornkop 239 IQ. Consent in terms of Section 11(2) of the MPRDA to cede a renewed prospecting right (MPT No. 29/2016) from Mintails SA Soweto Cluster (Pty) Ltd to West Wits was granted by the Department of Mineral Resources (DMR) in 2018 (Figure 1).

West Wits is in the process of a mining right application (MRA) in terms of the MPT No. 29/2016, that includes underground and opencast mining. The main operation will be underground, and the opencast planning includes 5 relatively small pits, namely:

- Rugby club main reef pit - 0.69 ha;
- Roodepoort main reef open pit - 6.43 ha
- Mona Lisa bird reef open pit - 5.31 ha;
- 11 shaft main reef open pit - 3.25 ha; and
- Kimberley East reef pit - 1.59 ha.

Malan Scholes Consulting (MSC) are assisting the mine with various legislative and planning processes relating to the mining right, and two other smaller permit applications. Golder Associates (Golder) completed the Final Decommissioning, Rehabilitation and Closure Plan (FDRCP), with associated costs, for the two smaller permit applications in 2018. MSC again appointed Golder to compile the scheduled rehabilitation and closure costing related to the 5 opencast pits. The report has been developed in two parts:

- Part A: Scheduled closure and rehabilitation costing and planning that can be incorporated into the MRA FRDCP as required; and
- Part B: Rehabilitation planning largely aligned to the requirements of an Annual Rehabilitation Plan, Appendix 3, of the financial provision regulations published under the National Environmental Management Act, Act No 28 of 1998 (NEMA GNR 1147), as amended.

1.1 Information provided

Specific studies and data made available include:

- Project specific communications, West Wits and RS Mellet (Pty) Ltd;
- Electronic file (DXF) containing the pit shell and dump models for each opencast pit. Bara Consulting (Bara, 2018);
- Electronic files (DXF) containing the survey contours for the MRA. (Kirschoff professional surveyors, 2018);
- West Wits opencast sequence (SLR consulting, 2019); and
- Conceptual post mining landform and initial volumetric assessment for costing purposes (Golder, 2018).

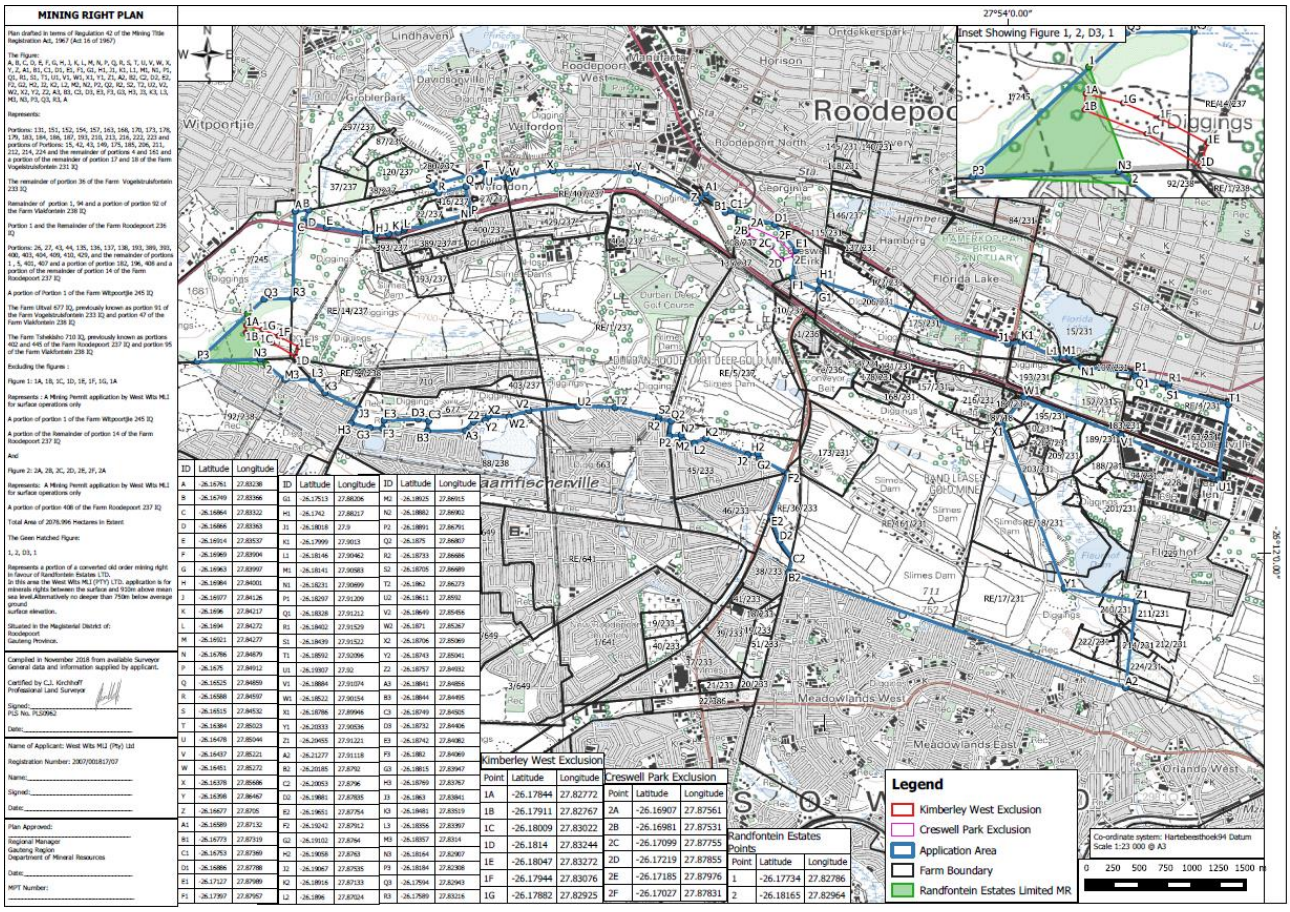


Figure 1: West Wits Mining Right Application boundary

1.2 Mine contact details

Table 1: Contact details of West Wits opencast operation

Name of company	West Wits MLI (Pty) Ltd
Name of project	Scheduled rehabilitation and closure costs for 5 opencast pits
Postal address	Meyer &Co, Block A, Tiger Valley Office Park, 1st Floor, 10 Pony Street, Silver Lakes, Pretoria, 0081
E-mail address	nhoek@malanscholes.co.za
Telephone number	011 593 4737
Cellular no	082 071 7571

1.3 Closure assessment practitioner

This closure plan was compiled by Golder, under the technical lead of Anthony Lamb. Contact details are provided below.

Table 2: Contact details for Closure Assessment Practitioners

Name of company	Golder Associates Africa (Pty) Ltd
Name of Mine	West Wits opencast operation
Name of project	Rehabilitation planning and costing for West Wits opencast operations
Postal address	Podium at Menlyn 43 Ingersol Road Menlyn 0181 Gauteng
Telephone number	+27 (0) 11 254 4839

The core specialists who contributed to the closure planning process, and their relevant professional registrations and experience, are listed in Table 3. *Curriculum Vitas* are provided in APPENDIX A.

Table 3: Details of specialists

Specialist	Task	Professional registrations/experience
Anthony Lamb	Project manager and Closure Plan compilation	BSc Hons (Environmental management), 22 years' experience
Johan Bothma	Technical inputs and review	PrLArch (SACLAP) BL, ML 15 years' experience
Douglas Richards	Post mining landform modelling and volumetric assessment	B-Tech Civil Engineering 9 years' experience

PART A – SCHEDULED CLOSURE COSTS

2.0 CLOSURE PLAN BATTERY LIMITS

The battery limits for the rehabilitation and closure planning includes the five pits, namely:

- Rugby club main reef pit - 0.69 ha (Figure 2);
- Roodepoort main reef open pit - 6.43 ha (Figure 3)
- 11 shaft main reef open pit - 3.25 ha (Figure 4);
- Mona Lisa bird reef open pit - 5.31 ha (Figure 5); and
- Kimberley East reef pit - 1.59 ha (Figure 6).

The general layout plans for each pit has the following aspects (Figure 2 to Figure 6)

- Opencast pit and mining direction (refer to Figure 7 - Figure 12 for the concurrent backfill and final void positions);
- Topsoil berm;
- Overburden stockpile,
- Platform area; and
- The planned haul roads.

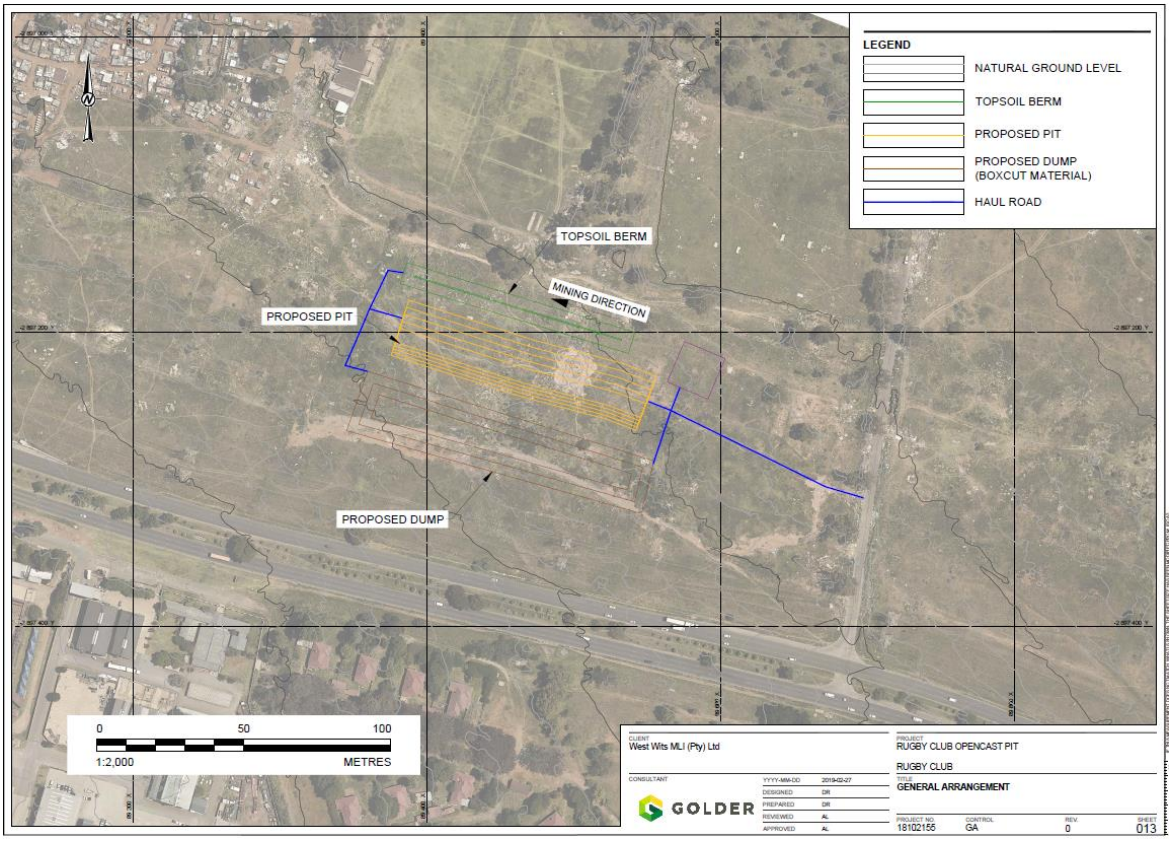


Figure 2: General arrangement plan: Rugby Club main reef open pit

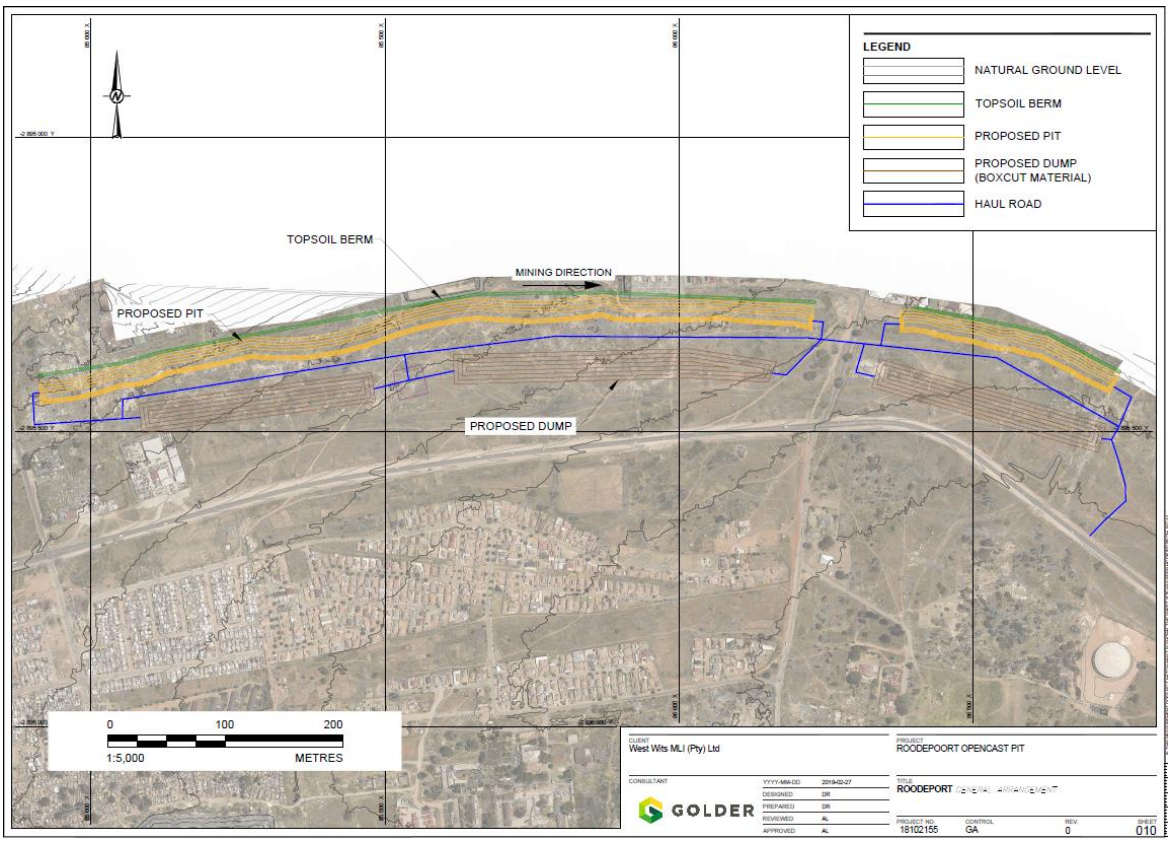


Figure 3: General arrangement plan: Roodepoort main reef open pit

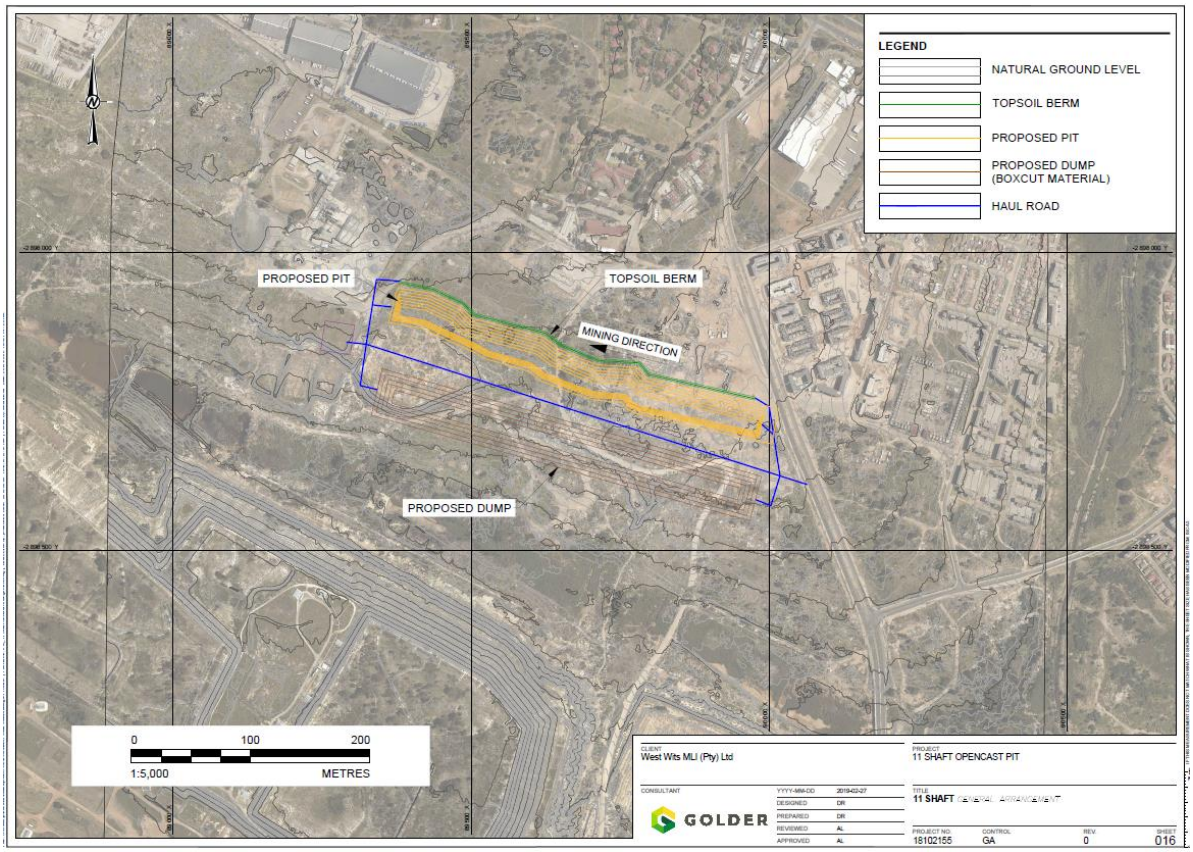


Figure 4: General arrangement plan: 11 Shaft main reef open pit

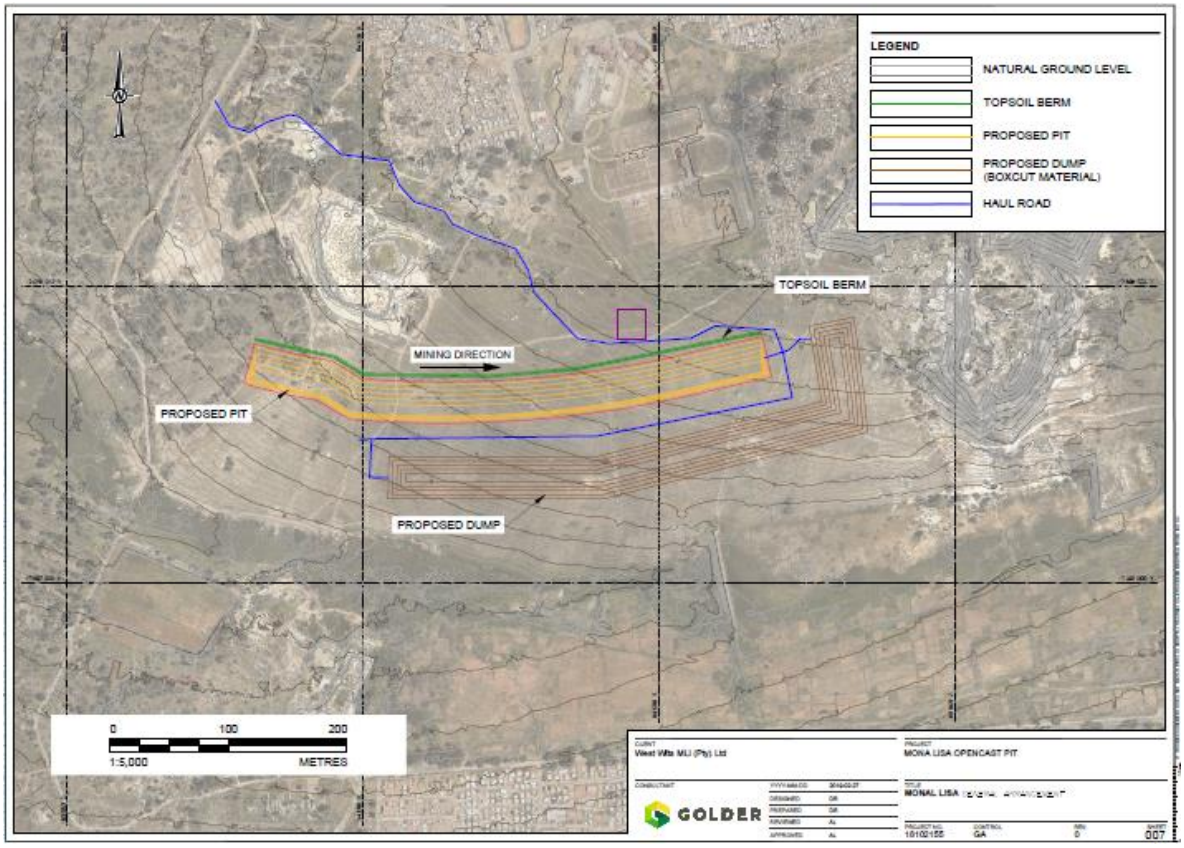


Figure 5: General arrangement plan: Mona Lisa bird reef open pit

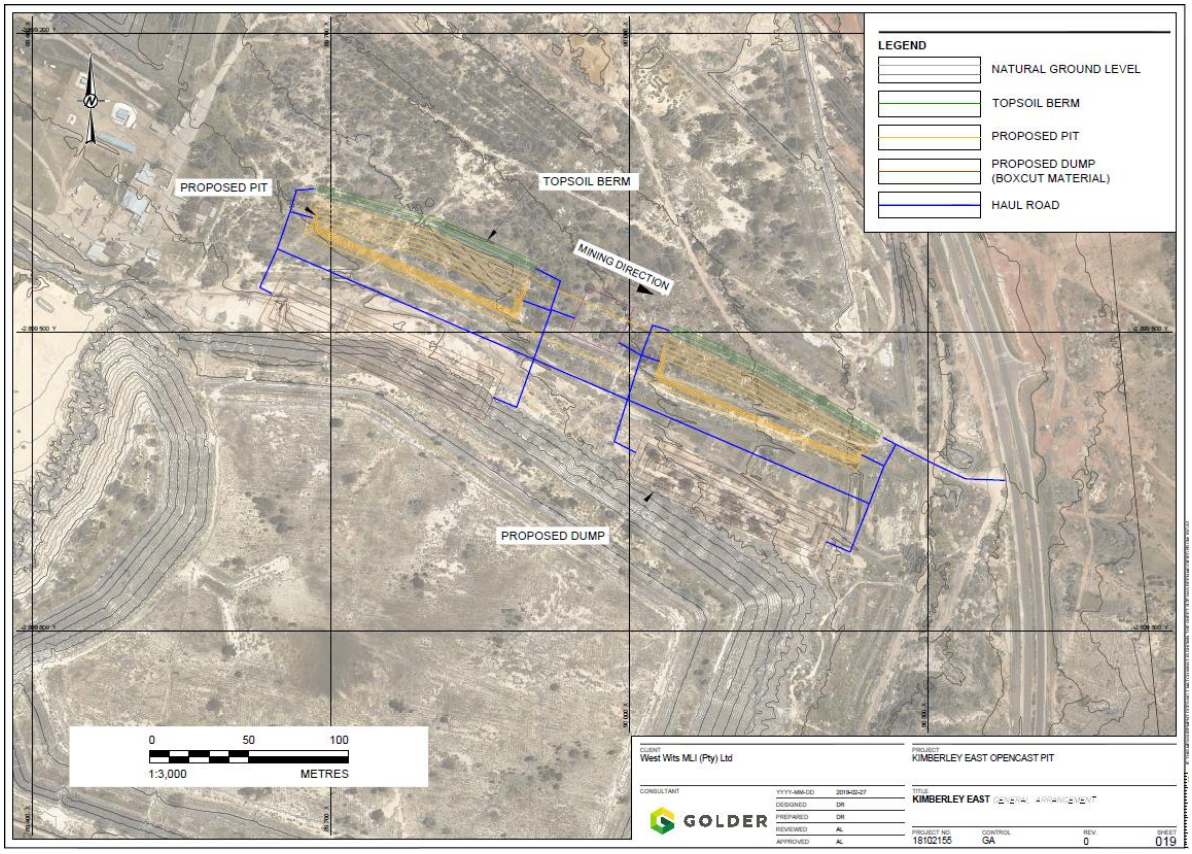


Figure 6: General arrangement plan: Kimberley East reef open pit

2.1 Guiding principles

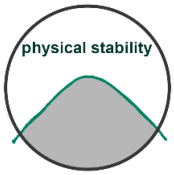
The following broadly accepted principles have been adopted to guide the preliminary rehabilitation and closure planning for the proposed five opencast pits:

- Closure and Rehabilitation Planning must comply with relevant legislation, as well as with generally accepted good practices;
- Closure-related rehabilitation of land disturbed by mining must be conducted to allow for pre-determined post-mining land uses, as agreed with stakeholders. In this regard, the rehabilitated areas must be safe, stable and non-polluting for integration into the existing land uses;
- Closure actions / measures conceptualised and implemented must limit the potential adverse effects of the closed mine site on the receiving environment, and thereby ensure that the quality of life of the surrounding / resident communities is not compromised after closure by possible threats to the health and safety of people and their animals;
- Closure measures must be sustainable under foreseeable natural events;
- Closure objectives must be realistic and achievable;
- Priority must be given to the use of locally available natural materials and / or vegetation as opposed to imported / synthetic material and / or exotic vegetation. The measures provided must be appropriate for the site-specific conditions;
- The success, performance and sustainability of the closure measures must be demonstrated and confirmed by suitable monitoring and measurement for an adequate period post closure;

- A site with limited residual care-and-maintenance requirements must be sought. In this regard, proven sustainable passive measures must be favoured over measures that require ongoing maintenance and / or active care post-closure;
- Involvement of stakeholders must be undertaken in a meaningful manner to inform Closure planning by reflecting local requirements, priorities and preferences, as well as the requirements as stipulated in local and provincial planning as well as the municipal Integrated Development Plans / frameworks; and
- Closure should be achieved as efficiently and cost effectively as possible.

2.2 Objectives

The following seven key closure objectives are routinely employed to provide overarching direction to the planning process:

	To create a physically stable, safe, rehabilitated landscape that limits long term environmental degradation, erosion and failure / collapse of unavoidably remnant mining residue which are present on the mine site post closure, thus enabling the successful establishment of the planned post-mining land use
	To ensure that local environmental quality is not adversely affected by possible physical effects and chemical contamination arising from the mine site or individual facilities, as well as to sustain catchment yield as far as possible after closure
	To limit the possible health and safety threats to humans and animals using the rehabilitated mine site as it becomes available
	To re-instate a suitable land capability over the mine site to facilitate the progressive implementation of the planned post-mining land use
	To create a landscape that is self-sustaining and over time will converge to the desired ecosystem structure, function and composition
	To encourage, where appropriate and as aligned to the planned post-mining land use, the re-establishment of native vegetation on the rehabilitated mine site such that the terrestrial biodiversity is largely re-instated over time
	To ensure that there is constructive engagement and alignment with local communities and regulatory authorities regarding the proposed end land use

3.0 MINING DESCRIPTION

3.1 Mining and Rehabilitation methods

The proposed West Wits opencast mining consists of five small pits with a life span of only a couple of months each. The pits will be mined sequentially (one at a time) with the rehabilitation of the final void over lapping with the start of the boxcut for the next pit. The pits will be mined in the following sequence (Table 4):

- Rugby club main reef pit;
- Roodepoort main reef open pit;
- 11 shaft main reef open pit;
- Mona Lisa bird reef open pit; and
- Kimberley East reef pit.

The pits will be mined using a conventional excavate, load and haul mining cycle. The methodology applied to mine out the remaining gold will be to disrupt the smallest possible footprint and to maximise concurrent backfilling of the pit in a timeous and cost-effective manner. The mining method will be as follows (communication from West Wits/Environmental Strategies, 30 January 2019):

- Clear/strip topsoil and place in a berm parallel to the length of the pit. The topsoil berm and overburden stockpile are in separate locations to ensure no materials mixing takes place;
- Develop a boxcut approximately one third of the strike length and stockpile the removed overburden in the designated area (allowing for an estimated 23% bulking factor). The stockpile will be temporary and will be placed on the in-situ topsoil;
- Construct an access ramp with suitable equipment to access the ore body as part of the boxcut development;
- No blasting is planned for this operation. Breakage of any material that is not susceptible to free-dig excavation will be enabled through excavators fitted with rock breaking technology (Xcentric Rippers).
- Initiate the second cut, adjacent to the boxcut, once the boxcut reaches its final depth. Excavated overburden from the second cut will be used to backfill the boxcut void (concurrent backfill);
- Should multiple reefs be mined, the middling between the reefs will be transported to surface and stored;
- Backfill the remaining void (one third of the strike length) with the stockpiled material. Excess material, due to the estimated 23% bulking factor, will be transported off site by a third party;
- Replace the topsoil to approximate pre-mining depths once all voids have been backfilled to the pre-mining natural ground level (NGL);
- Rip all disturbed areas to alleviate compaction and scarify in preparation for seeding;
- Conduct dedicated soil fertility sampling and analysis and hydroseed with suitable ameliorants and seed mix;

3.2 Operational areas and life of mine (LoM)

The mining schedule for the proposed opencast pits stretch over a period of approximately 26 months (refer to the schedule in Table 4) The final rehabilitation, once mining stops, will be completed within another 2 months.

Table 4: Opencast pit mining and rehabilitation sequence (SLR consulting, 2019)

Activity / Year		Timeline													
		Year 1				Year 2				Year 3	Year 4	Year 5	6-25	26	27-28
Pit	Phase	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4						
Rugby Club Main Reef Pit	Mining														
	Rehabilitation														
Roodepoort Main Reef Pit	Mining														
	Rehabilitation														
11 Shaft Main Reef Pit	Mining														
	Rehabilitation														
Mona Lisa Bird Reef Pit	Mining														
	Rehabilitation														
Kimberley Reef East Pit	Mining														
	Rehabilitation														
Continued opencast rehabilitation and construction of infrastructure complexes															
Underground mining operations															
Steady state production achieved															
Decommissioning and closure															
Aftercare and maintenance (underground and infrastructure)															
Table legend: Mining; Concurrent rehabilitation; Final void rehabilitation; Scheduled rehabilitation and closure cost components															

4.0 POST-MINING LAND USE

The post-mining land uses related to the proposed five opencast pits have been developed and agreed to with the land owners, and are described as:

- Rugby club main reef pit: The land owner is currently in a planning phase and is considering either residential or mixed industrial development;
- Roodepoort main reef pit: the land owner has planned public open / green belt spaces;
- 11 Shaft main reef pit: the land owners have earmarked these areas for mixed industrial, residential developments and the construction of bulk service infrastructure;
- Mona Lisa bird reef pit: the landowners plan to construct mixed residential developments post closure; and
- Kimberley East: Part of the area will be used to access the surface infrastructure planned to service the proposed underground operation.

4.1 Preferred closure option

The preferred rehabilitation and closure option to support the next land use for each pit, is:

- Backfill the open pit to pre-mining elevations to create a free-draining post mining landform;
- Remove additional overburden due to the 23% bulking factor from site (3rd party);
- Replace all topsoil stripped ahead of mining;
- Rip all disturbed areas to alleviate compaction;
- Ameliorate affected soils based on dedicated soil fertility sampling and analysis; and
- Establish vegetation and monitor/maintain the rehabilitated land to achieve relinquishment criteria agreed to with the land owners.

4.2 Closure scenario

Leading on from the preferred option, the closure scenario is formulated to provide the context within which decommissioning, and closure activities will occur, i.e. a “snapshot” view of the last day of operations, taking account of operational mine and rehabilitation planning.

Table 5: Closure scenario (last day of operations)

Aspect	Description
Mining	■ The Kimberley East final void will be backfilled with the remaining overburden stockpile material to design elevations; ■ Topsoil will be replaced from the topsoil berm onto the backfilled opencast area to a specified depth; ■ All remaining disturbed areas will be ripped to alleviate compaction, scarified and revegetated; ■ In situ soils under the removed overburden stockpile and topsoil berm will be ripped to alleviate compaction and revegetated; and ■ The haul roads will remain as access roads for the post closure land users.

Aspect	Description
Water management	■ An allowance is made to ensure that the surface water runoff from the post mining landform is aligned with the natural drainage framework and protected from erosion.

4.3 Post mining landform modelling and volumetric assessment

To quantify the materials movement related to the mining and rehabilitation planning, an initial post mining landform model was developed for each pit based on a first order volumetric assessment. The volumetric assessment outcomes were also used to develop a predicted mined out landform for each pit, indicating:

- The extent of the boxcut stockpile based on volumes removed (including the additional 23%),
- The post mining landform achieved through concurrently backfilling phase 1 (boxcut) and phase 2;
- The configuration of the final void aligned with the volumes available in the overburden stockpile;
- The topsoil berm based on volumes stripped; and
- The platform cleared for each pit where equipment will be stored / parked.

The mined-out landform and predicted post mining landform for each pit is indicated in the following figures, including sections through the length of the pits:

- Rugby club main reef pit - Figure 7 and Figure 9
- Roodepoort main reef open pit - Figure 9 and Figure 10;
- 11 shaft main reef open pit - Figure 11 and Figure 12;
- Mona Lisa bird reef open pit - Figure 13 and Figure 14; and
- Kimberley East reef pit 1.59 ha - Figure 15 and Figure 16.

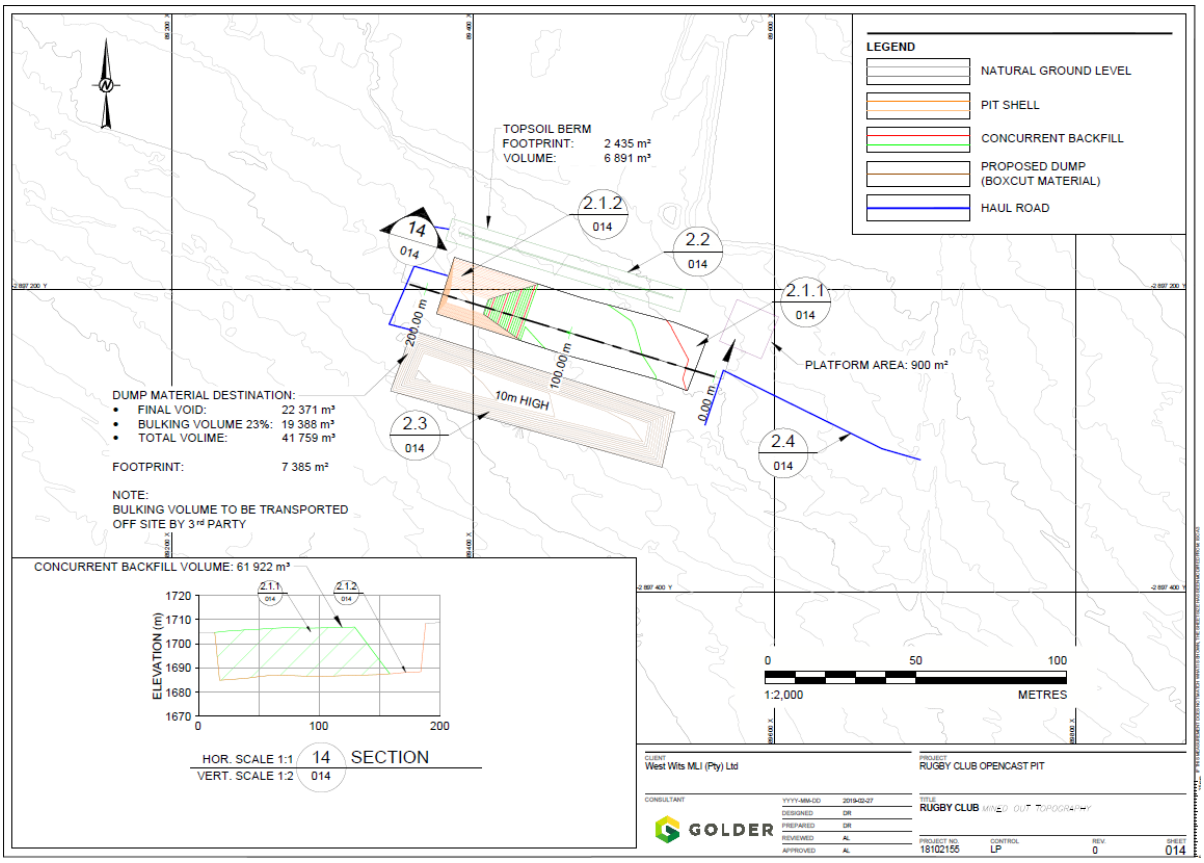


Figure 7: Rugby Club main reef pit predicted mined out landform

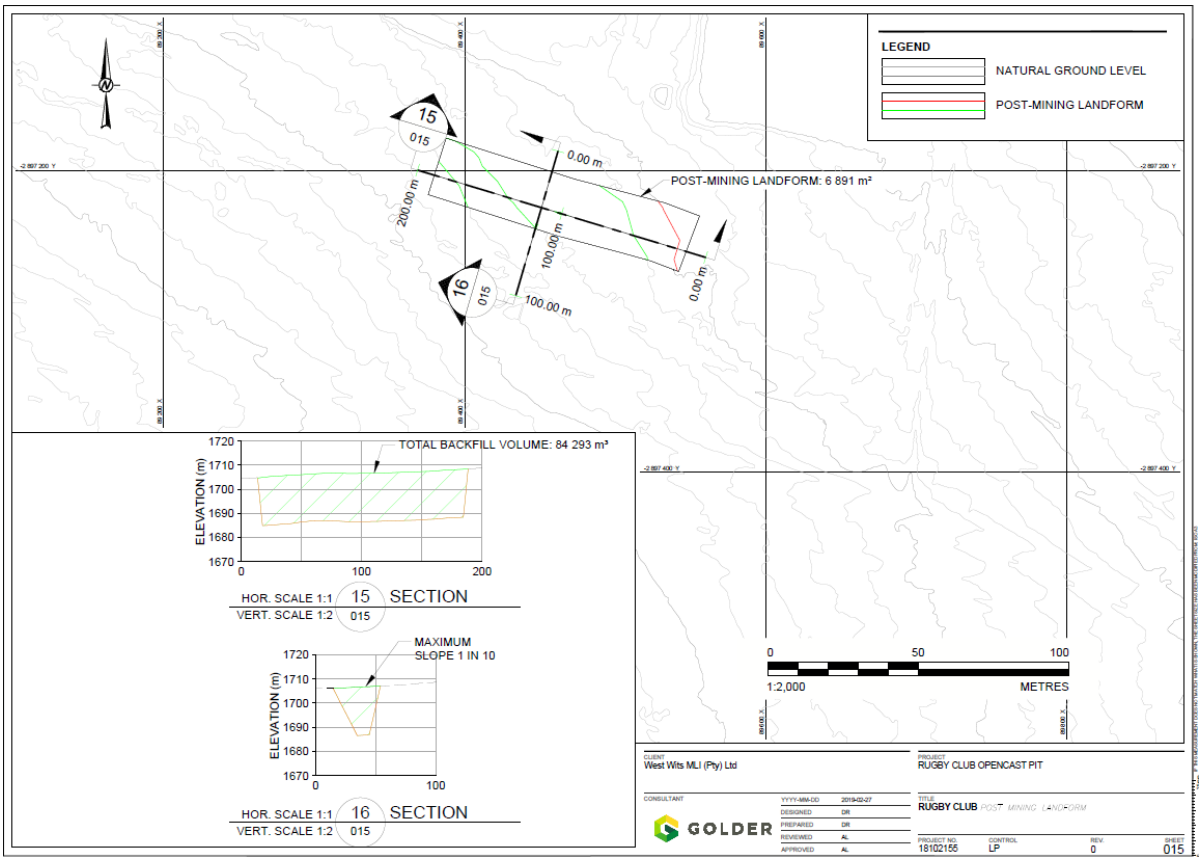


Figure 8: Rugby Club main reef pit predicted post mining landform

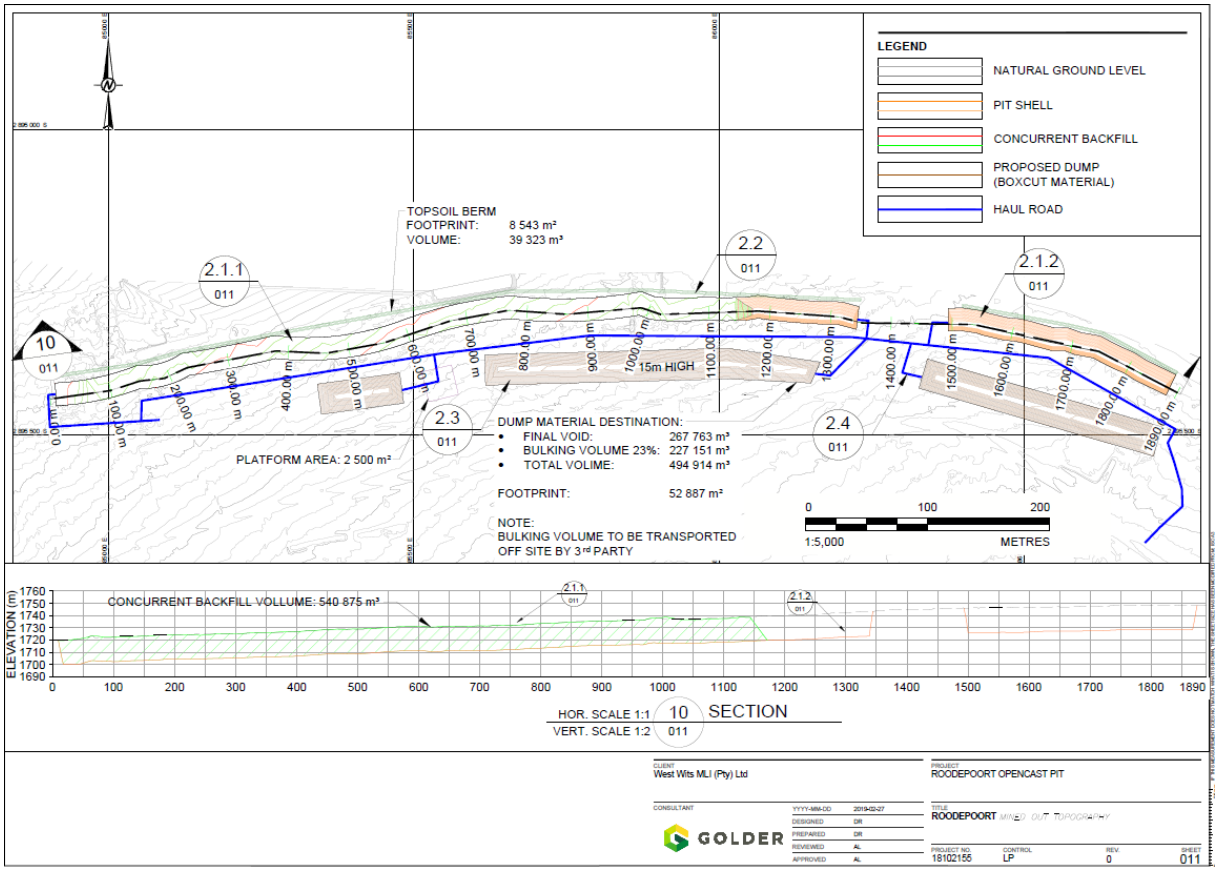


Figure 9: Roodepoort main reef pit predicted mined out landform

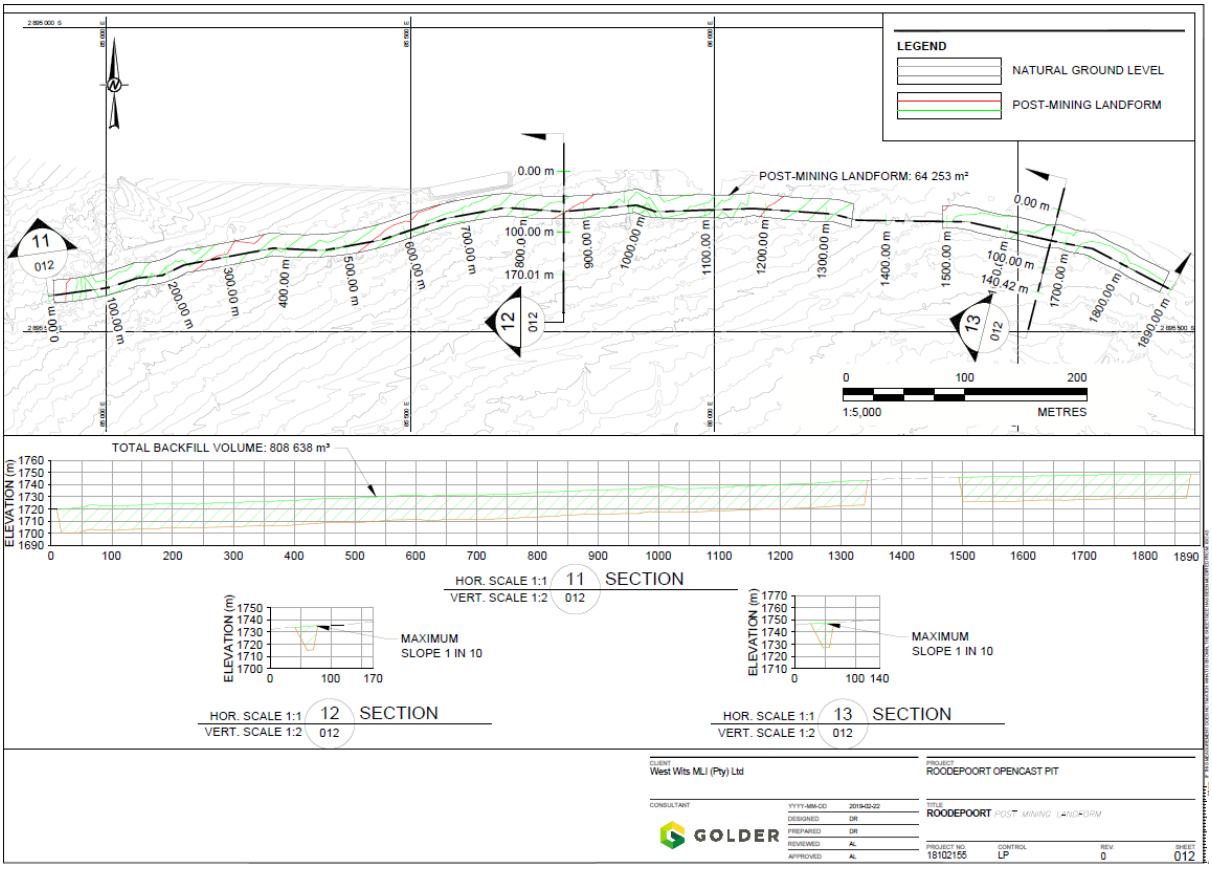


Figure 10: Roodepoort main reef pit predicted post mining landform

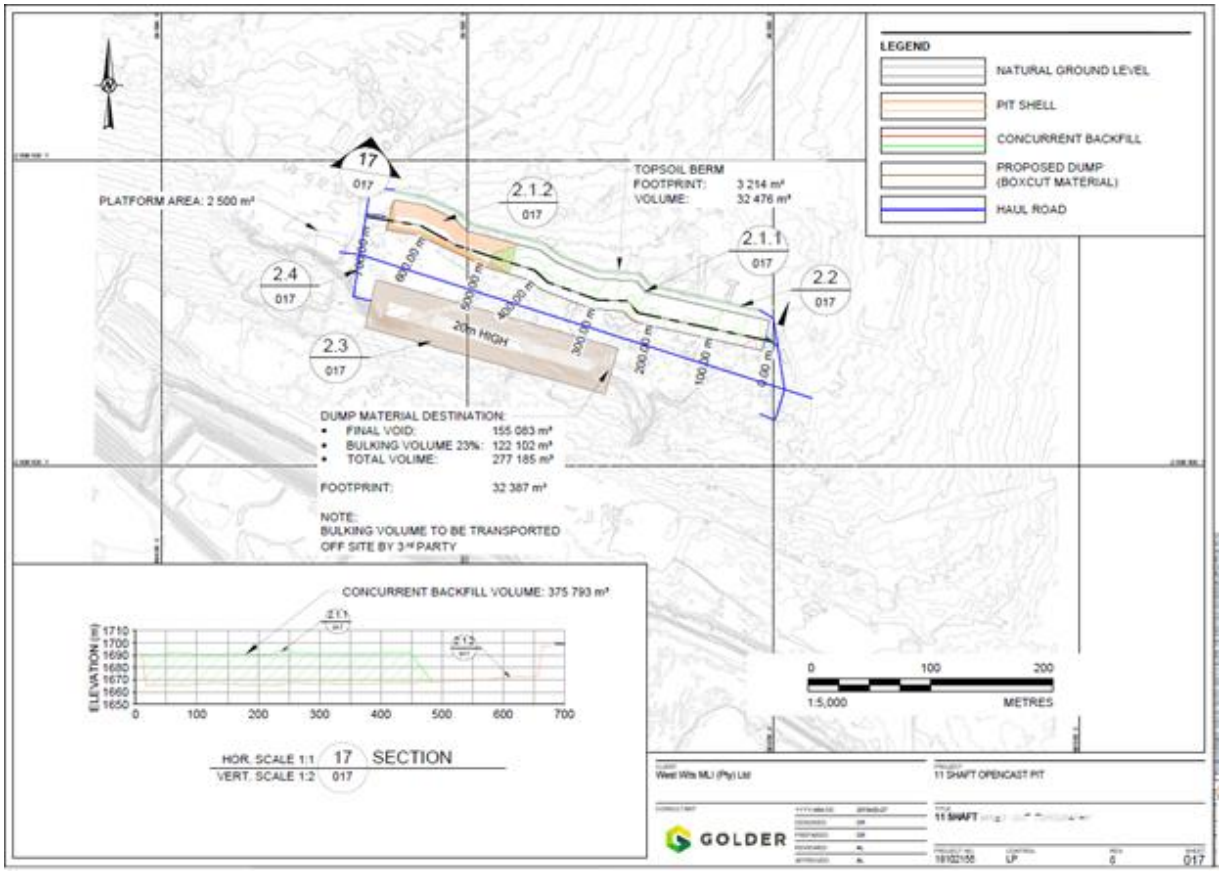


Figure 11: 11 Shaft main reef pit predicted mined out landform

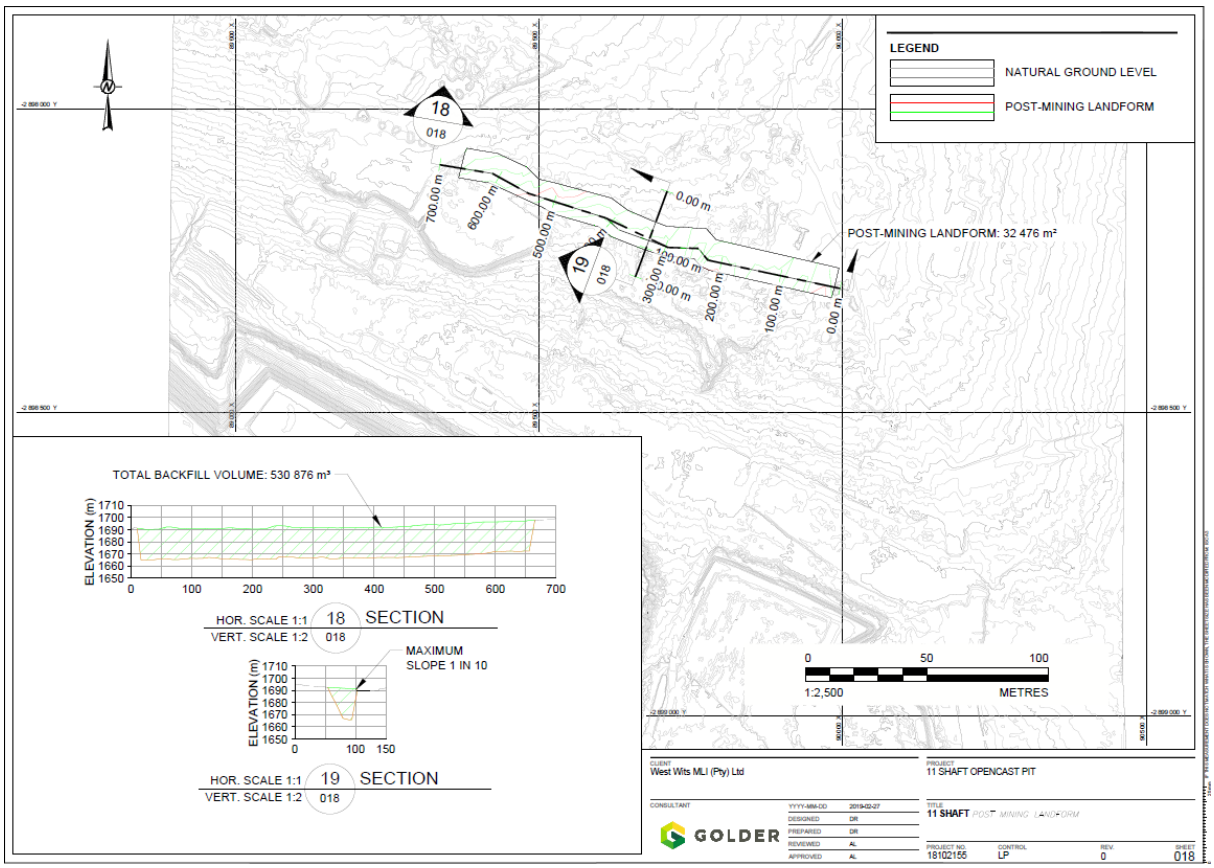


Figure 12: 11 Shaft main reef pit predicted post mining landform

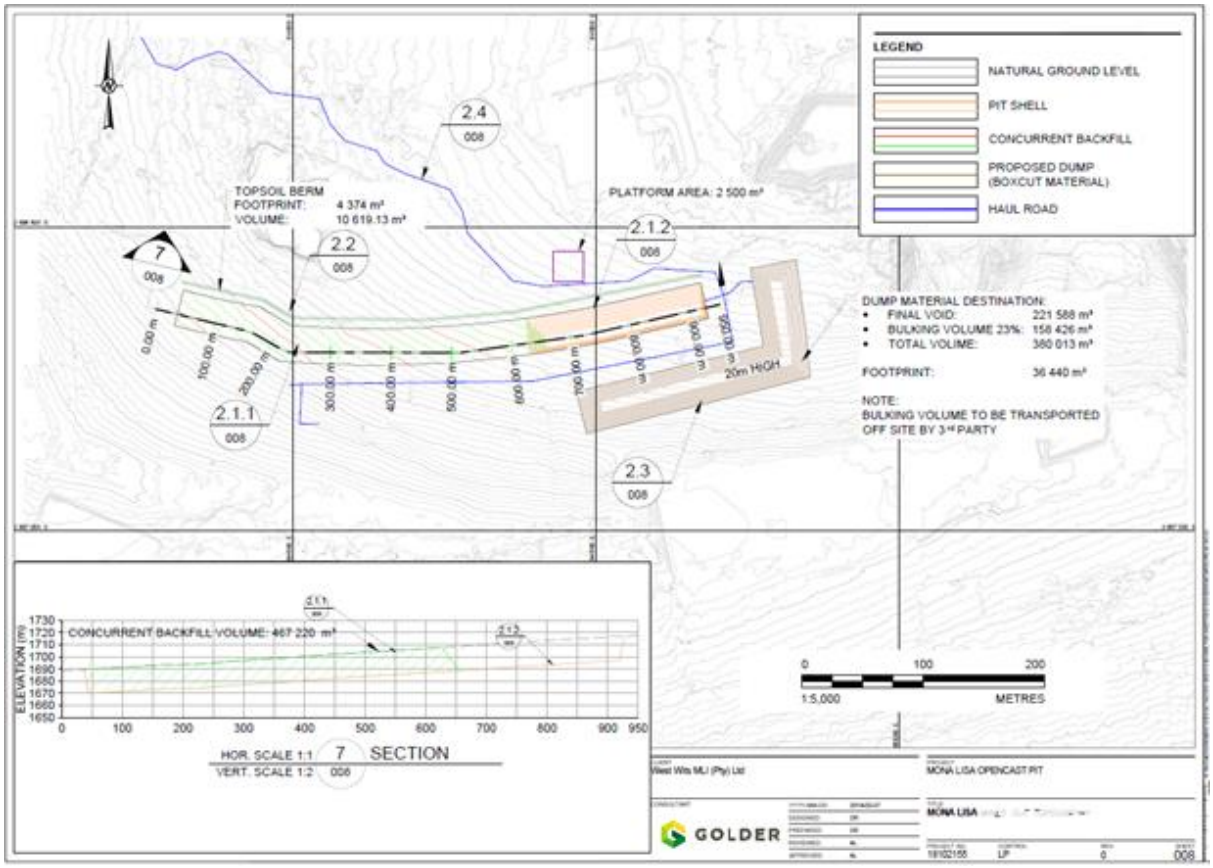


Figure 13: Mona Lisa bird main reef pit predicted mined out landform

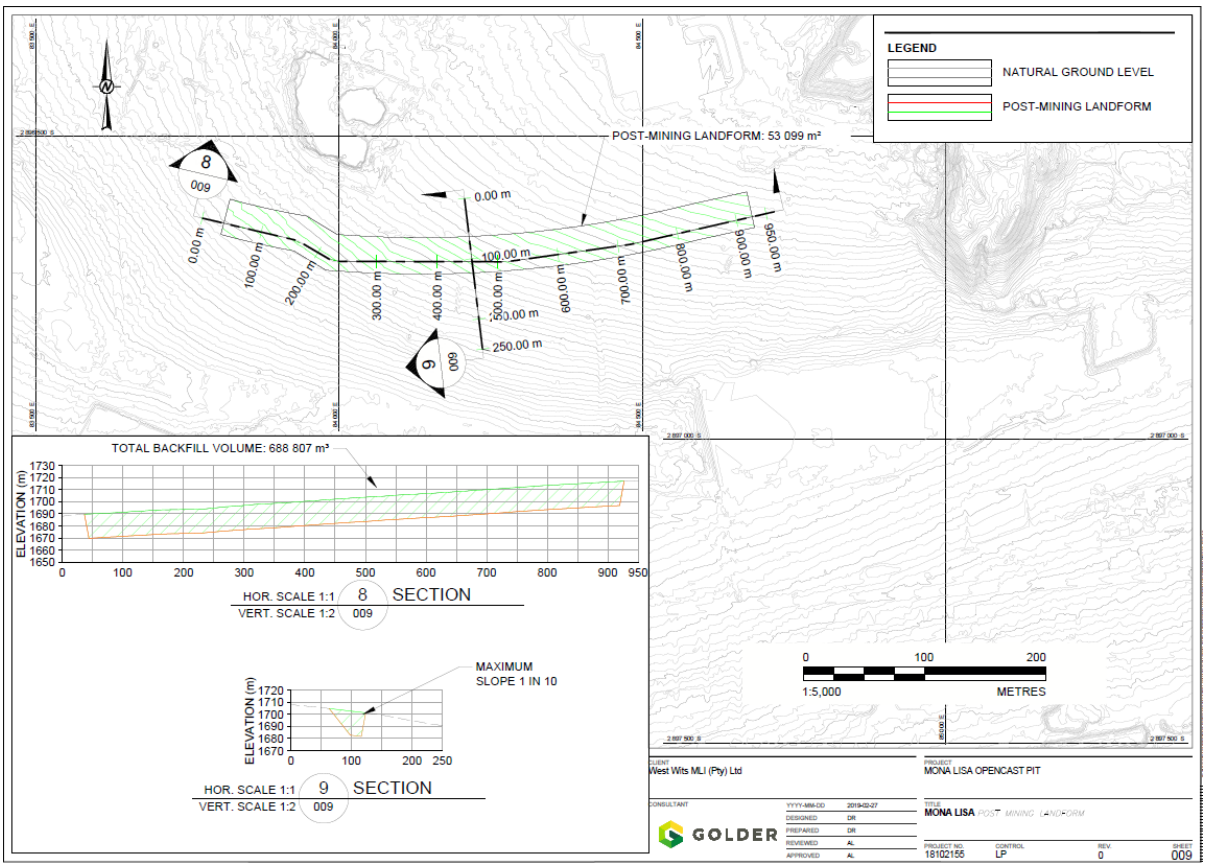


Figure 14: Mona Lisa bird reef pit predicted post mining landform

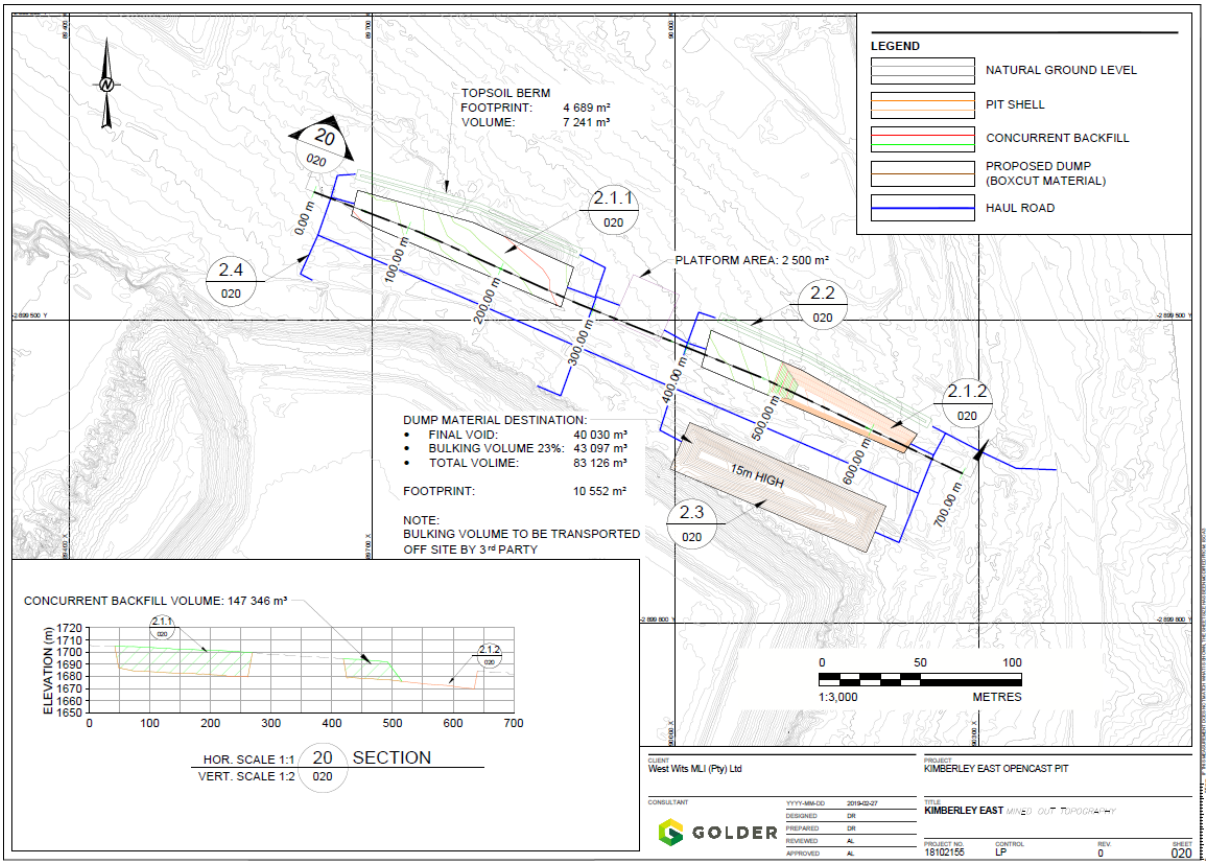


Figure 15: Kimberley East reef pit predicted mined out landform

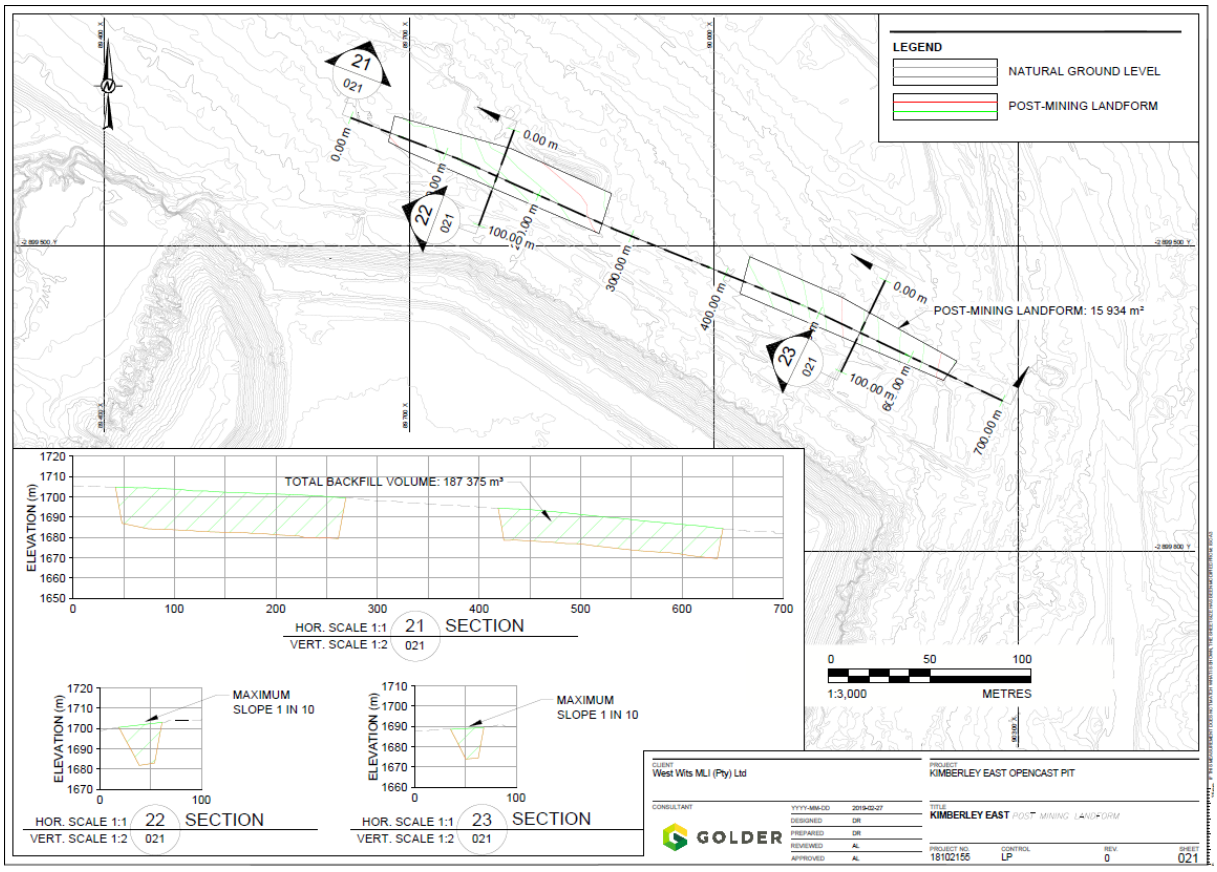


Figure 16: Kimberley East reef pit predicted post mining landform

5.0 CLOSURE ACTIONS AND COSTING

The LoM rehabilitation and closure costs were determined for each pit to inform the LoM scheduling for all five pits. The outcome was used to determine the cashflow aligned with the schedule and specifically to calculate the scheduled closure costs. The closure actions form the basis for the costing and are provided in the following categories:

- Specific closure actions for infrastructure, mining areas, general surface rehabilitation and post-closure aftercare and monitoring; and
- The closure cost determination based on the specific closure actions.

5.1 Specific closure actions

Specific rehabilitation and closure actions for the life of the operation and forming the basis of the rehabilitation and closure operations have been determined for each area itemized in Figure 7, Figure 9, Figure 11, Figure 13 and Figure 15 for each pit and described in the battery limits. The operational rehabilitation costs have been determined for each pit (Table 8) and included in the planning and cash flow schedule (Table 9). The closure actions form the basis for the scheduled closure liability assessment. The actions required at the point of closure are indicated according to the following categories:

- Mining areas; and
- General surface rehabilitation.

5.1.1 Mining areas

The concurrent backfilling during the operations will limit the mass earthworks required to backfill the Kimberley East reef pit final void. A dedicated conceptual post mining landform model was developed to inform this rehabilitation and closure cost. The model will require calibration throughout the LoM to ensure an accurate materials balance. Final rehabilitation and closure measures, once mining has ceased, include the following (listed with the plan and costing item number itemized in Figure 15):

Boxcut and phase 2 of each pit

- Load, haul topsoil from the topsoil berm, tip at the correct spacing and level to the specified depths;
- Conduct fertility sampling, have the soils analysed at an accredited laboratory and define amelioration measures based on the results;
- Rip replaced soils to alleviate compaction and scarify the area; and
- Establish vegetation (includes specified amelioration and seed mix application).

Final void

- Backfill the open pit final void with load and haul material from the waste stockpile to the elevations specified in the post mining landform design;
- Load, haul topsoil from the topsoil berm tip at the correct spacing and level to the specified depths;
- Conduct fertility sampling, have the soils analysed at an accredited laboratory and define amelioration measures based on the results;
- Rip replaced soils to alleviate compaction and scarify the area; and
- Establish vegetation (includes specified amelioration and seed mix application).

Topsoil berm

- Load and haul topsoil from the berm and place on prepared open pit areas and cleared stockpile footprint to specified depths;
- Ensure that the footprint is cleared of any fugitive material that could damage agricultural equipment;
- Rip in-situ soils to alleviate compaction;
- Conduct fertility sampling, have the soils analysed at an accredited laboratory and define amelioration measures based on the results; and
- Establish vegetation (includes specified amelioration and seed mix application).

Overburden Stockpile

- Load and haul the waste material from the stockpile to backfill the western final void;
- Ensure that the footprint is cleared of rocks that could damage agricultural equipment;
- Rip in-situ soils to alleviate compaction;
- Conduct fertility sampling, have the soils analysed at an accredited laboratory and define amelioration measures based on the results; and
- Establish vegetation (includes specified amelioration and seed mix application).

Haul roads

Haul roads will remain intact and handed over to the next land users.

5.1.2 General surface rehabilitation

The general surface rehabilitation measures for the proposed opencast pit are limited to the following:

Water management

An allowance has been made for integrating surface water runoff with the surrounding drainage framework. This may include polishing and shaping with a dozer/grader or constructing small contour berms across the site. The backfilling and shaping to be free-draining, replacing topsoil and effective vegetation establishment should suffice.

6.0 PERFORMANCE MONITORING

The following preliminary measures are proposed and are to be further refined with future updates of the rehabilitation and closure plan.

6.1 Demonstration period

It is envisaged that a five-year demonstration period will be required for surface and ground water quality to confirm success of closure (included in the operational monitoring programme for the underground operation). A period of three years is proposed for the demonstration of successful rehabilitation. Following the completion of earthworks and vegetation establishment, a visual inspection will be undertaken to inform corrective action required, if needed. Thereafter, ongoing monitoring and corrective action as per Table 6 will be undertaken.

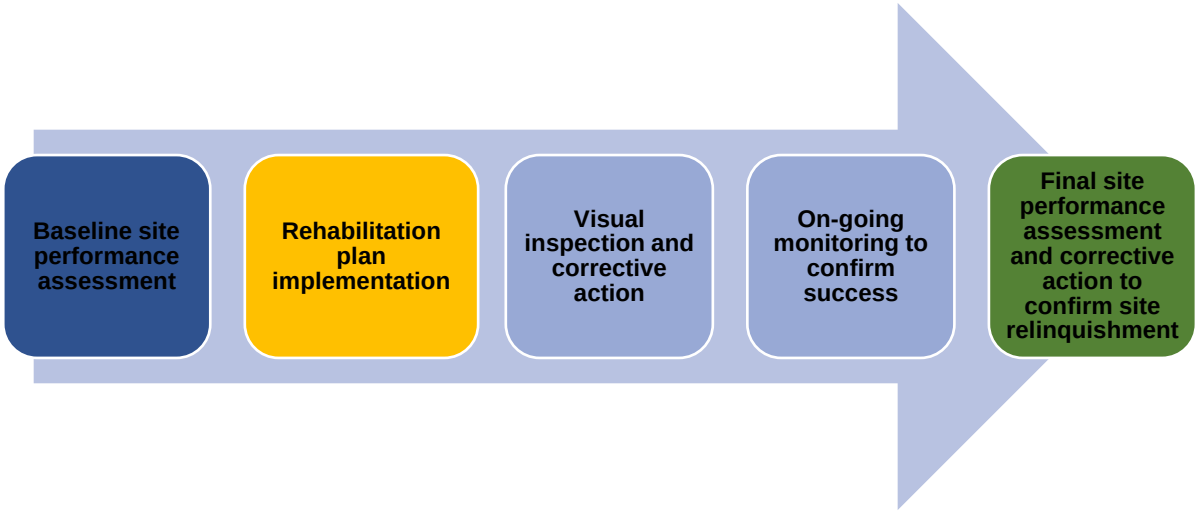


Figure 17: Final rehabilitation plan roll out and performance monitoring

6.2 Baseline environmental site performance assessment

A baseline site performance assessment (largely based on existing information and supplemented by a dedicated site walkover) must be conducted prior to rehabilitation implementation. The aim of the environmental site performance assessment is to establish the *status quo* / baseline and knowledge base against which results of monitoring conducted after rehabilitation will be measured. Additionally, a site performance assessment could be a requirement as part of environmental permitting for decommissioning of the site in terms of the provisions of NEMA.

6.3 Monitoring and corrective action

Annual vegetation and soils monitoring, corrective action (as required) and care and maintenance of the site will be done for three years, or until abandonment criteria are met. Annual rehabilitation performance reports should be compiled and included in the final rehabilitation plan for submission to the authorities.

The monitoring objectives, network, sampling routine and analysis for vegetation, soils and landform are reflected in Table 6.

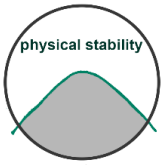
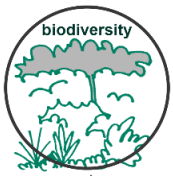
6.4 Final site performance assessment

A post-rehabilitation land use and land capability assessment should be conducted at the end of the three-year rehabilitation phase. The final site performance assessment will be used to document the success of rehabilitation for record keeping.

6.5 Monitoring and closure targets

The measurable criteria indicated in Table 6 should be used to assess the effectiveness of the specific closure actions implemented during rehabilitation. These criteria will also assist in determining when the standard of closure achieved is sufficient to relinquish responsibility for a specific area. The site-specific aspect, monitoring requirement, indicators and closure targets are included in the table, and will require discussion and agreement with land owners.

Table 6: Rehabilitation monitoring and measurement

Broad objective	Aspect	Monitoring requirements	Indicators	Closure Targets
	Post mining landform	Construction management and as-built survey comparisons of the post mining landform elevation.	Design elevations achieved to within 150mm tolerance	EMPr commitments
	Soil erosion and landform stability	Visual assessments.	Lack of rill or gully erosion	EMPr commitments
	Soil management	Monitoring and management of rehabilitation activities.	Depth and methodology of topsoil placement	EMPr commitments
	Soil fertility and amelioration	Soil sampling, chemical analysis and amelioration specifications.	Soil chemistry and physical properties (compaction)	EMPr requirements
	Dust generation	Source and receptor monitoring	Dust, particle size and potential contaminants	EMPr commitments
 	Vegetation, soils, land capability and potential land use	Annual vegetation and soils monitoring (3 years); Final land use and land capability assessment in 3rd year after rehabilitation.	Vegetation characteristics, soil physical and chemical properties, land use and land capability classification.	EMPr, WUL and BAP commitments

6.6 Relinquishment criteria

The relinquishment criteria indicated in Table 7 is proposed for the West Wits opencast pits and is applicable to rehabilitated areas. The criteria, indicators and reporting requirements are listed against the environmental aspect. The criteria will have to be agreed to with the land owners and aligned with the planned next land use for each pit.

Table 7: proposed relinquishment criteria of environmental aspects at the proposed open pit operation

Aspect	Closure criteria	Indicators	Reporting requirements
Land capability	Assessment against pre-mining capability	Including but not limited to: Topsoil quality (chemical analysis); Topsoil quantity (specified depths); Compaction; effective rooting depths and erodibility.	Monitoring and maintenance reporting; Final Land capability and land use assessment.
Land use	Post mining land-use achieved after 3 years of monitoring and maintenance.	Land use and land capability assessment as defined between the land owners and West Wits in support of the planned next land uses.	Land capability assessment to determine suitability after 3 yrs.
landform stability	Assessment of as-built surveys against post-mining landform design.	Localized differential settlement, free-draining surface and erosion.	Visual assessments during yr. 1-3, As-built survey comparisons.

7.0 CLOSURE COSTS

This section provides details on the proposed closure cost. The outlined assumptions and limitations also underpin the basis of this closure cost determination. It is important to note that the estimation is based on existing information.

7.1 Methodology

The costing methodology applied is summarized as follows:

- Undertook a site visit to key areas and facilities to confirm observations and assumptions (June 2018);
- Developed an itemised plan indicating an inventory of closure aspects based on the proposed life of mine plan and discussions with mine personnel;
- Defined specific rehabilitation actions for each through discussions with West Wits and specialists working on the MRA, previous impact assessment outcomes, industry guidelines, conceptual modelling and rehabilitation experience;
- Quantified the rehabilitation actions by conducting a first order volumetric assessment based on the electronic mining plan, pit shell, post mining landform modelling and specialist study inputs;
- Obtained rates through consultation with rehabilitation and civil construction companies. Rates are based on the volumes and distances for mass earthworks, areas requiring amelioration and vegetation and experience of similar closure and rehabilitation cost components;
- Calculated monitoring and maintenance costs through defining the required monitoring and maintenance, obtaining rates for laboratory analysis, specialists, travelling, accommodation and equipment rates; and

- Compiled a dedicated closure spreadsheet to determine the closure costs of the quantified actions through applicable rates.

7.2 Assumptions and qualifications

The costing is based on the following general assumptions:

- This report addresses rehabilitation costs required at closure (Kimberley East reef pit final void only) and the post closure monitoring and maintenance;
- The costs equate to third party contractors conducting the specified mass earthworks, soil amelioration, vegetation establishment and maintenance;
- Rates have been determined through experience and consultation with contracting companies active in the mining industry;
- Specialist involvement in monitoring, laboratory analysis, devising further amelioration measures, updating models and report writing have been allowed for;
- The costing provided does not include the following:
  - Post closure surface and ground water monitoring, as this will be covered by the operational costs and included in the routing monitoring programme of West Wits;
  - Post closure staffing and related infrastructure required by the mine; and
  - Labour force retraining, relocation, redeployment or severance package negotiations.
- In accordance with the NEMA regulations, no offsetting of costs against salvageable values were considered;
- No allowance was made for post closure water treatment, this costing relates to rehabilitation measures only;
- Allowance is made to backfill the opencast pits with overburden to a 1:1 ratio, additional material due to the bulking factor of 23% will be removed by a third party and is not included in the rehabilitation costs;
- Preliminary and general items and contingencies are indicated as 10 percent and 5 percent (respectively) of the total at closure;
- The storm water management measures were assumed to be small trenching and berms constructed on surface;
- The costs are based on the information provided which is assumed as accurate and correct;
- Due the short nature of the operation only the scheduled costs are reported with pre-site relinquishment costs (monitoring and aftercare); and
- Potential costs relating to latent and residual risks (if any) are not included in the rehabilitation costing.

7.3 Closure costs

The rehabilitation costs for each pit across the life of mine were determined to inform the life of mine rehabilitation and closure schedule and associated cash flow (Table 9). The summary of the LoM rehabilitation costs for each pit is indicated in the table below. The scheduled closure costs are calculated in Table 9.

Table 8: Life of Mine closure costs for each open pit to inform the scheduled closure cost calculation

18102155 MRA 5 opencast pits Closure Costs, as at February 2019													
Closure components		Life of Pit rehabilitation and closure costs to inform the scheduled closure cost											
		Mona Lisa Pit		11 Shaft Pit		Roodepoort Pit		Rugby Club Pit		Kimberly East Pit		Total	
1	Infrastructural aspects												
2	Mining aspects	R	4,255,043.53	R	3,412,756.37	R	5,637,090.10	R	560,478.77	R	926,539.95	R	14,791,908.73
3	General surface rehabilitation												
4	Water management	R	57,590.78	R	41,972.20	R	76,383.71	R	10,438.03	R	20,039.30	R	206,424.01
	Sub-Total 1	**R**	**4,312,634.30**	**R**	**3,454,728.57**	**R**	**5,713,473.81**	**R**	**570,916.80**	**R**	**946,579.24**	**R**	**14,998,332.73**
5	**Post-Closure Aspects**												
5.1	Surface water monitoring												
5.2	Groundwater monitoring												
5.3	Rehabilitation monitoring	R	211,722.00	R	211,722.00	R	211,722.00	R	211,722.00	R	211,722.00	R	1,058,610.00
5.4	Care and maintenance	R	338,841.12	R	246,947.67	R	449,411.23	R	61,413.19	R	117,903.21	R	1,214,516.42
5.5	Contingencies for post-closure aspects	R	55,056.31	R	45,866.97	R	66,113.32	R	27,313.52	R	32,962.52	R	227,312.64
	Sub-Total 2	**R**	**605,619.43**	**R**	**504,536.64**	**R**	**727,246.55**	**R**	**300,448.71**	**R**	**362,587.73**	**R**	**2,500,439.06**
6	**Additional Allowances**												
6.1	Preliminary and general	R	431,263.43	R	345,472.86	R	571,347.38	R	57,091.68	R	94,657.92	R	1,499,833.27
6.2	Contingencies	R	215,631.72	R	172,736.43	R	285,673.69	R	28,545.84	R	47,328.96	R	749,916.64
6.3	Additional studies												
	Sub-Total 3	**R**	**646,895.15**	**R**	**518,209.29**	**R**	**857,021.07**	**R**	**85,637.52**	**R**	**141,986.89**	**R**	**2,249,749.91**
	Grand Total Excl. VAT. (Sub-total 1 +2 +3)	**R**	**5,565,148.88**	**R**	**4,477,474.50**	**R**	**7,297,741.43**	**R**	**957,003.03**	**R**	**1,451,153.86**	**R**	**19,748,521.71**

The calculated costs for each pit were used to determine the cashflow for operational rehabilitation and the scheduled closure costs (refer to Table 9 and note the colour coding for void rehabilitation, post closure costs during operations and total scheduled closure costs):

- The totals for the mining aspects, water management and the additional allowances (P&Gs and contingencies) make up the final void rehabilitation for each pit;
- The total for the post closure aspects is indicated for three years post closure. The costs are divided into quarters for the first two years as appropriate, the annual costs are reflected for the subsequent years and/or remaining value depending on when the rehabilitation was completed in the first year; and
- The scheduled closure costs include the Kimberley East reef pit final void, related post closure costs and the remainder of the post closure costs for each pit from the point of closure (when all mining ceases).

Table 9: MRA open pit rehabilitation and closure planning schedule, cashflow and total scheduled closure costs

Activity		Timeline										
		Year 1				Year 2				Year 3	Year 4	Year 5
Pit	Phase	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Annual	Annual	Annual
Rugby Club Main Reef Pit	Mining											
	Rehab+3yr Post closure				R656,554	R25,037	R25,037	R25,037	R25,037	R100,150	R100,150	
Roodepoort Main Reef Pit	Mining											
	Rehab+3yr Post closure				Concurrent	Backfill	R6,570,495 final void rehab	R60,604	R60,604	R242,416	R242,416	R121,208
11 Shaft Main Reef Pit	Mining											
	Rehab+3yr Post closure						R3,972,938	R42,045	R42,045	R168,179	R168,179	R84,089
Mona Lisa Bird Reef Pit	Mining											
	Rehab+3yr Post closure							R4,959,529	R50,468	R201,873	R201,873	R151,405
Kimberley Reef East Pit	Mining											
	Rehab+3yr Post closure								R1,088,566	R120,863	R120,863	R120,863
Cashflow including aftercare and maintenance					R656,554	R25,037	R10,568,470	R5,087,215	R1,266,720	R833,480	R833,480	R477,565
Total scheduled Closure Costs									**R3,411,244**			

8.0 REHABILITATION AND CLOSURE PLAN REFINEMENT

8.1 Planned amendments and gaps

The following should be implemented to further refine the closure planning for the proposed West Wits opencast pits:

- Develop the conceptual post mining landform to detailed design level prior to the commencement of the concurrent backfill;
- Confirm if all specific rehabilitation specifications relating to the planned next land use is incorporated into the rehabilitation actions;
- Capture improved accuracy regarding the bulking factor into the design, planning and costing as required;
- Develop and include a detailed topsoil balance for the site based on actual survey data to replace the current estimates;
- Utilise the improved topsoil data to accurately plan the topsoil placement depths;
- Incorporate the relevant outcomes of the specialist studies detailed in the scoping report and EIA phase of the larger mining right application;
- Develop a detailed monitoring plan;
- Develop detailed relinquishment criteria;
- Refine the closure scheduling; and
- Include a revision of the closure costs to improve the accuracy running into the closure phase.

PART B: ANNUAL REHABILITATION PLANNING

9.0 ENVIRONMENTAL AND PROJECT CONTEXT RELEVANT TO PLANNED REHABILITATION

9.1 Review of the rehabilitation conducted to date

The planned opencast mining areas are currently included in a mining rights application, and therefore no activities on site have taken place yet.

9.2 Planned rehabilitation

The opencast mining is currently planned to commence in Quarter 1 (Q1) of year 1 and will continue for approximately 21 months. The final void of the first 4 pits to be mined sequentially will be backfilled and rehabilitated within the operational period. The final void rehabilitation corresponds with the boxcut development of the next pit (Table 4). The last pit to be mined is the Kimberley East reef pit, once the mining ceases at the end of year 2 Q3 the scheduled closure period starts. Refer to Table 9 for the rehabilitation costs and cashflow.

9.3 Steps for year 1

The particular steps in the mining and rehabilitation process is the same for each pit (mining direction is indicated in the pit layouts Figure 2 to Figure 6). The progression of mining and rehabilitation has been separated in to the following stages:

Stage 1:

- Strip all available soils ahead of mining and store in a berm adjacent to the pit boundary (an additional 5% of the calculated volumes is allowed for to protect the pit edges from topsoil losses); and
- Establish the boxcut for each pit approximately 1 third of the strike length, overburden removed to access ore will be stockpiled next to the planned final void.

Stage 2:

- Mine the second cut (another 1 third of the strike length) and use the overburden to backfill the boxcut. The concurrent backfilling limits materials re-handling, reduces the overburden stockpile footprint, and reduces the costs of mass earthworks at closure.

Stage 3:

- Mine the final cut (1 third of the strike length) and concurrently backfill the second cut, leaving only the final void to be backfilled from the overburden stockpile.

Rehabilitation:

- Backfill the final void utilizing the adjacent overburden stockpile to construct a post mining landform (Figure 8, Figure 10, Figure 12, Figure 14 and Figure 16);
- Replace topsoil from the berm across the backfilled pit and cleared stockpile footprint; and
- Rehabilitate all affected areas, excluding haul roads.

The volumes of overburden for each stage were calculated based on the survey data (Kirschoff, 2018), the pit shell designed by Bara (2018) and the post mining landform developed by Golder for the proposed pit. The topsoil volumes are calculated based on the area of the pit and the topsoil depth provided by West Wits. The volumes (m^3) of topsoil and overburden to be moved for each quarter in the year 1 is aligned with the proposed mining schedule (Table 4) and indicated with the area (ha) expected to be disturbed and rehabilitated in Table 10.

The following is foreseen in year 1 (Table 10):

- The Rugby Club main reef pit will be mined out and rehabilitated in year 1 (stage 1 – 4);
- The Roodepoort main reef pit boxcut (stage 1) will be established and the second stage concurrent backfilling will be completed; and
- The 11 Shaft main reef pit boxcut will be completed (Stage 1).

The total area disturbed in year 1 is 20 ha compared to 2 ha that will be rehabilitated. The variance is due to the development of three pits in year one. The rehabilitation backlog will be caught up in year 2 (Table 9), leaving only the Kimberley East reef pit to be addressed at closure. It is important to note that the overburden volumes indicated are 1:1, the additional volume based on the 23% bulking factor will be stockpiled and then removed by a third party.

Table 10: Volumes moved, and areas disturbed / rehabilitated in year 1

Activity		Timeline			
		Year 1			
Pit	Mining/rehabilitation action	Q1	Q2	Q3	Q4
Rugby Club Main Reef Pit	Topsoil stripped (m^3)	7,029			
	Boxcut to stockpile (m^3)	22,371			
	Concurrent backfill (m^3)		30,961	30,961	
	Final void backfill from stockpile (m^3)				22,371
	Topsoil replaced (m^3)				7,029
	Area disturbed (Ha)	2			
	Area rehabilitated (Ha)				2
Roodepoort Main Reef Pit	Topsoil stripped (m^3)			40,109	
	Boxcut to stockpile (m^3)			267,763	
	Concurrent backfill (m^3)				270,438
	Final void backfill from stockpile (m^3)				
	Topsoil replaced (m^3)				
	Area disturbed (Ha)	6			
	Area rehabilitated (Ha)				
11 Shaft Main Reef Pit	Topsoil stripped (m^3)				33,126
	Boxcut to stockpile (m^3)				155,083
	Concurrent backfill (m^3)				
	Final void backfill from stockpile (m^3)				
	Topsoil replaced (m^3)				
	Area disturbed (Ha)	13			
	Area rehabilitated (Ha)				

9.4 Rehabilitation objectives for Year 1

The objectives in the first year is the following;

- Ensure that trained staff and management measures are in place to strip and store topsoil correctly to minimise mixing, losses and compaction;
- Limit the disturbed footprint size to the planned activities only; and
- Continually monitor concurrent backfill and rehabilitation measures for the Rugby club pit and ensure that learnings are fed back into the planning to continually improve the rehabilitation implementation for the remaining pits.

9.5 Additional measures to consider prior to the start of mining

Due to the short time frame for the proposed opencast operations, the following rehabilitation related actions should take place before mining commences:

- Develop the conceptual post mining landform design to detailed design level for implementation purposes;
- Compile a detailed topsoil balance to confirm and manage volumes throughout the LoM;
- Develop and implement operational monitoring and management protocols; and
- Utilise any knowledge gained from the backfilling and rehabilitation of the Sol Plaatjie opencast operation, operated and rehabilitated by West Wits in the same vicinity, and build it into the rehabilitation and closure plan where applicable.

9.6 Operational monitoring plan

An operational monitoring plan should be developed for the proposed opencast pit. The proposed parameters to be monitored, frequency of monitoring and period of monitoring are indicated in Table 11.

Table 11: Proposed operational monitoring plan

Proposed operational monitoring plan			
Aspects	Parameters	Frequency	Responsibility
Material balance: topsoil and overburden	Soil stripping depth, soil stockpiling, soil placement depth and maintaining the life of mine topsoil balance; and verifying the actual overburden bulking factor.	Active daily management of operations; and A monthly survey consolidation.	Site environmental manager and the surveyor
Topsoil quality	Soil physical and chemical properties, accurate implementation of soil management practices to reduce mixing and compaction	As live topsoil stripping and placement occurs; and active daily management of stripping, stockpiling and placement activities.	Site environmental officer and soil scientist
Dust	Source and receptor monitoring	Monthly	Site environmental officer and air pollution specialist
Surface and groundwater quality	Surface water and ground water sampling to be	Monthly	Site environmental officer

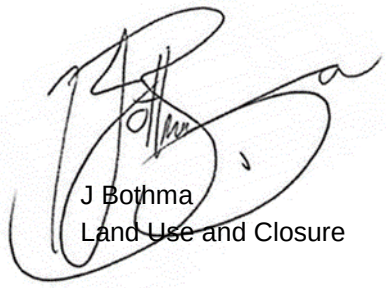
Proposed operational monitoring plan			
	incorporated into the broader mine monitoring programme.		
Ground water quantity	Groundwater elevations, maintenance of the numerical ground water models and pit water balance, also incorporated into the broader mine monitoring programme.	Monthly monitoring and bi-annual updates	Site environmental manager and geohydrologist
Post mining landform	Measure compliance to the post mining landform design elevations, a tolerance of 150mm is proposed.	Active daily management of operations; and A monthly comparison of as-built surveys and the design elevations.	Site environmental manager and the surveyor
Extent of disturbed areas	Spatial extent of the pit, stockpiles and haul roads.	Delineate and manage disturbed areas.	Site environmental manager and surveyor.

10.0 CONCLUSION

This rehabilitation and closure costing relates to the five planned opencast pits within the broader MRA and is based on information provided by West Wits, RS Mellet (Pty) Ltd and other technical specialists. Good practice measures widely adopted by the South African and international gold mining industry were incorporated where deemed necessary. It is recommended that the next update of this closure cost be undertaken by 2020, to include the specialist studies planned to address knowledge gaps and based on a thorough assessment of the new regulations when promulgated.

GOLDER ASSOCIATES AFRICA (PTY) LTD.

A Lamb
Land Use and Closure



J Bothma
Land Use and Closure

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APPENDIX A

CV’s of Closure Assessment Practitioners

Golder Associates Africa (Pty) Ltd. – Pretoria

Land Use and Closure: Senior Rehabilitation and Closure Consultant

Anthony Lamb has 21 years' experience in rehabilitation and closure planning, design and implementation across the mining and industrial sectors. Anthony worked on various opencast and underground coal mining operations in the Mpumalanga highveld of South Africa as a Research Assistant, Scientific Officer, Land Rehabilitation Officer and an Environmental coordinator. The latter roles had a specific emphasis on managing land rehabilitation activities within the mining operations. After 10 years of gaining operational experience he moved to consulting. The last 11 years he has focused on closure planning, liability determination and integrated mine and rehabilitation planning to help companies understand, directly address and reduce their environmental liabilities.

Education

University of South Africa: BSc Honours Geography & Environmental Management

University of Johannesburg: BSc Geography & Environmental Management

Tshwane University of technology: Certificate in Environmental Chemistry

Eco-Training: Higher Diploma in Game ranging.

Various short courses, including:

- Finance for non-financial managers - The Gordon Institute for Business (GIBS) 2012;
- Tools for Wetland Assessment - Rhodes University 2011;
- Pollution and Rehabilitation - University of the Free State;
- Basic Principles of Ecological Rehabilitation - University of North West;
- NOSA auditors course;
- Understanding ISO14001 – South African Bureau of Standards;
- Foundation course in Environmental Auditing – Aspects International; and
- Various Game Ranging Practical courses at Klaserie, Moholoholo and Sabi Sands game reserves.

Internal course attended at Golder Associates include:

- Introduction to the Upstream Petroleum Industry (Oil and Gas School);
- Tailings and Mine Waste Management; and
- Manager Excellence;

Internal Courses completed while at Fraser Alexander:

- Tailings Management and Design - 201

PROFESSIONAL SUMMARY

Golder associates Africa (2018 - current)

Anthony rejoined the Land use and Closure Division within Golder Associates Africa as a Snr mine rehabilitation and closure consultant. He brings 21 years of experience to the team and will focus on progressing closure planning, costing and integrated rehabilitation planning for clients across mining and industrial industries.

Wrink Environmental engineers (2016-2018)

Anthony was a co-founder of WRINK environmental engineers (PTY) Ltd. The company was established in 2016 and provided land rehabilitation, closure, waste management and waste engineering services to the mining and industrial industries. Successful projects include:

- Designing and modelling the post-mining landform and quantifying the mass earthworks required at closure for on opencast pit at Royal Baphokeng Platinum;
- Developing the Final Rehabilitation, Decommissioning and Closure Plan (FRDCP), Annual Rehabilitation Plan (ARP) and Environmental Risk Assessment Report (ERAR) with accurate quantification of annual and closure rehabilitation costs for a planned opencast operation at Anglo Platinum (aligned with the NEMA GN 1147 requirements);
- Compiling the FRDCP, ARP and ERAR according to the NEMA GN 1147 minimum requirements for a gas extraction operation by Tetra4 Gas;
- Developing a closure route map for AngloGold Ashanti; and
- Determining the closure liability for an underground expansion at Samancor.

Anthony also Presents the Landform Modelling and Planning module for the Ecological Rehabilitation and Mine Closure course offered at the Centre for Environmental Management (North West University).

Fraser Alexander tailings (2012-2015)

Anthony held the position of Business Development Lead: Rehabilitation within the Business Development Division of Fraser Alexander Tailings situated in Jet Park. Responsibilities included technical support to the operations in South Africa, within other African countries and South America; and the development of new products and new business within the rehabilitation domain.

Languages

English – Fluent

Afrikaans - Fluent

Professional Affiliations

IAIAsa

Golder associates Africa (2008-2011)

As Divisional Leader of the Rehabilitation and Closure Division of Golder Associates Africa (Golder purchased African EPA in 2008), he was responsible for the day-to-day operations of the division as well as marketing and providing technical expertise. The role required close liaison across various Golder divisions for integrated projects, as well as developing and maintaining key relationships with clients. Anthony was responsible for the implementation and project management of several closure liability determination projects in South Africa, notably the following:

- Determining the decommissioning and closure liability for all ESKOM coal fired Power Stations in South Africa, the wind farm at Sere, open cycle gas turbines in the Western and Eastern Cape and the pump storage scheme in the Drakensburg;
- Planning and quantifying the decommissioning and rehabilitation required for closure of Namaqualand mines (De Beers), and subsequently updating the reporting for inclusion into the sale of the mine;
- Calculating the decommissioning and closure liability for Saldhanha Steel in the Western Cape; and
- Devising the rehabilitation and closure liability for several coal mines in South Africa including Exxaro, Xstrata and Anglo operations.

African EPA (2005-2008)

Fulfilling the role of Environmental Scientist for African EPA, Anthony was specifically focused on the modelling of post mining landforms, integration of mining and rehabilitation planning and the optimization of mass earth works for the opencast coal mining industry. He completed surface water specialist studies, closure cost estimates and rehabilitation planning for the following:

- all Eskom coal fired Power Stations,
- BHP Billiton operations including all pits at Middleburg Mines, Khutala and Klipspruit,
- Anglo Coal Kleinkopje and Isibonello Colliery,
- Glencore Xstrata Impunzi and Tweefontein operations;
- Sasol Coal Syferfontein Colliery; and
- Optimum Colliery West pit.

Anglo Coal (1997-2005)

Anthony started his career working for Anglo Coal Central Environmental Services (ACES) and subsequently as Scientific and Rehabilitation Officer at Kriel Colliery and then Environmental Coordinator: Rehabilitation at New Vaal Colliery.

The role at ACES included maintaining the surface and ground water quality database for all Anglo Coal operations and developing monthly/annual reports. The responsibilities also included soil, surface and ground water monitoring for greenfields and closure sites.

Key aspects during the period at Kriel Colliery included the implementation of an ISO14001 system, developing monitoring systems to inform corporate sustainability reporting and managing rehabilitation and farming activities.

The position at New Vaal Colliery included managing the pre-strip fleet, dozing operations, placement of pre-strip material on reshaped spoils, revegetation and post-rehabilitation pasture management.
All roles included cross operational involvement in Environmental, Health and Safety auditing and engaging in various rehabilitation and environmental planning initiatives and forums.

Johan Bothma

Senior Land Use and Closure Consultant

Education

MLArch Landscape Architecture, University of Pretoria, Pretoria, 2004

BL Landscape Architecture, University of Pretoria, Pretoria, 2001

Certifications

South African Council for the Landscape Architectural Profession (SACLAP 20163)

Institute of Landscape Architecture in South Africa (ILASA)

Languages

English – Fluent

Afrikaans – Fluent

Professional Affiliations

Institute of Landscape Architecture of South Africa (ILASA)

South African Council for the Landscape Architectural Profession (SACLAP)

PROFESSIONAL SUMMARY

Mine Environment

Johan is the service lead for Closure Planning and Costing in the Land Use and Closure Team based in the Pretoria, South Africa office. He has 13 years' consulting experience and is currently advancing closure costing and planning for mining and industrial sites, with a focus on next land use planning and latent risk mitigation. Johan has completed many closure related projects for a wide variety of different commodity mines throughout Africa and abroad.

He also specialises in visual assessment and technical direction of graphic representation of project impacts and mitigation. He furthermore has considerable experience in impact assessment, environmental management plans and auditing for mining, industrial, commercial and property development and projects.

Johan is a professionally registered Landscape Architect and completed his Master's Degree in 2004, focusing on climate responsive design and energy efficiency for residential developments. He has previously worked on various landscape planning and design projects, including large scale open space management plans, as well as landscape architectural design for prestige governmental projects including the Presidential residence in Bryntirion Estate in Pretoria.

RELEVANT EXPERIENCE

KEY REHABILITATION AND CLOSURE PROJECTS

- **Sasol Secunda, Mpumalanga, South Africa (2015; 2017)**
  - Project manager for the 2015 and 2017 closure costs update for the Sasol Secunda Synfuels and Chemicals operations (including the Polymers, Explosives and Fertiliser facilities and all waste disposal facilities in the Secondary Areas), including waste disposal, post-closure water treatment and cash flows.
- **Mafube Coal Mpumalanga, South Africa (2017)**
  - Development of detailed closure plan; and GN 1147 compliant closure costs spreadsheets for bio-physical closure aspects. Qualitative and quantitative risk assessments to inform residual and latent risk mitigation and quantification of costs. Detailed water treatment costs and financial discounting.
- **Mafube Coal Mpumalanga, South Africa (2017)**
  - Development of detailed closure plan; and GN 1147 compliant closure costs spreadsheets for bio-physical closure aspects. Qualitative and quantitative risk assessments to inform residual and latent risk mitigation and quantification of costs. Detailed water treatment costs and financial discounting.

- **Voorspoed Diamond Mine Free State, South Africa (2017)**
  - Project manager of comprehensive closure plan and costs for final closure of Arnot Coal mine. Development of GN 1147 compliant closure costs spreadsheets. Qualitative and quantitative risk assessments to inform residual and latent risk mitigation and quantification of costs. Detailed water treatment costs and financial discounting.
- **Exxaro Arnot Coal Mine Mpumalanga, South Africa (2016)**
  - Project manager of comprehensive closure plan and costs for final closure of Arnot Coal mine. Development of GN 1147 compliant closure costs spreadsheets. Qualitative and quantitative risk assessments to inform residual and latent risk mitigation and quantification of costs. Detailed water treatment costs and financial discounting.
- **Sibanye Gold Beatrix, Kloof and Driefontein Mines Gauteng, Free State, South Africa (2013 - 2016)**
  - Project manager for transitional planning towards GN 1147 for the Beatrix, Kloof and Driefontein mines, including operational rehabilitation planning and costs determinations, as well as scheduled, residual and latent costs quantifications (2016). Scheduled and unscheduled closure cost updates for financial reporting and auditing purposes. Scheduled and unscheduled closure costs were also performed for 2014 and 2015 for the Cooke, Ezulwini and Rand Uranium Surface Operations (RUSO) obtained by Sibanye in 2013.
- **Sibanye Cooke, Ezulwini and RUSO operations Gauteng, South Africa (2014 - 2016)**
  - Project manager operational rehabilitation planning and costing, scheduled, residual and latent costs determination as well as related rehabilitation and closure planning towards GN 1147 compliance (2016). Scheduled and unscheduled closure costs for financial reporting and auditing purposes (2014 - 2015).
- **Gold Fields South Deep Mine Gauteng, South Africa (2013-2016)**
  - Project manager operational rehabilitation planning and costing, scheduled, residual and latent costs determination as well as related rehabilitation and closure planning towards GN 1147 compliance (2016). Project management, scheduled and unscheduled closure cost updates for South Deep gold mine for financial reporting and auditing purposes. Compilation of detailed next land use plan, rehabilitation and closure plans (2014-2015).
- **Morupule thermal power station Morupule area, Botswana (2016)**
  - Project manager scheduled closure costs determination and closure framework for Phase 2 expansion of the Morupule thermal coal power station.
- **Kenmare Moma Mine Sofala, Mozambique (2015)**
  - Project manager for scheduled and unscheduled closure cost updates for Moma sand mine in Mozambique.

- **New Denmark Colliery interim closure plan Mpumalanga, South Africa (2014)**
  - Project manager for interim closure plan for NVC according to the Anglo Closure Toolbox, which includes state of the environment, rapid strategic environmental assessment, closure criteria, risk assessment, closure costing and end land use plan reports.
- **New Vaal Colliery interim closure plan Free State, South Africa (2013)**
  - Project manager for interim closure plan for NVC according to the Anglo Closure Toolbox, which includes state of the environment, rapid strategic environmental assessment, closure criteria, risk assessment, closure costing and end land use plan reports.
- **Union Colliery land use plan Limpopo and North West Provinces, South Africa (2013)**
  - Preliminary post-closure next land use plan report and mapping for Union Colliery Platinum mine north of Rustenburg.
- **Zincor detailed land use plan Gauteng, South Africa (2013)**
  - Detailed evaluation of post-closure next land use options for the decommissioned Zincor zinc smelter complex, which includes extensive industrial plant and two tailings storage facilities.
- **Letlhakane and Jwaneng land use plans and graphic modelling Botswana (2012-2014)**
  - Preliminary post-closure next land use plans for the Letlhakane and Jwaneng open pit diamond mines in Botswana. Graphic modelling direction for various waste rock disposal alternatives for Jwaneng mine and end land use planning for Letlhakane Mine.
- **Thaba Metsi Coal Mine, Limpopo, South Africa (2012)**
  - Scheduled and unscheduled closure cost determinations, preliminary end land use plan for Thaba Metsi opencast and underground coal mine.
- **Goedehoop Colliery Mpumalanga, South Africa (2012)**
  - Scheduled and unscheduled closure cost determinations, preliminary land use plan for Goedehoop North and South underground coal mines.

KEY ENVIRONMENTAL ASSESSMENT, PERMITTING AND AUDITING PROJECTS

- **Zululand Anthracite Colliery Kwazulu-Natal, South Africa (2013, 2015)**
  - On-site assessment and environmental audits of EMP and ROD Requirements for ZAC operations.
- **Tubatse water treatment and pelletiser plant EMP audits Limpopo Province, South Africa (2010-2013)**
  - Six-monthly environmental compliance audits in terms of approved EMP and Environmental Authorisations for construction and operation of new water treatment plant and pelletiser plant.

- **Rand Uranium TSF EIA Gauteng, South Africa (2010)**
  - EIA lead for new long term tailings storage facility for disposal of up to 350 million tons of re-processed tailing from a number of tailing resources in the Randfontein area, including 40 km associated pipelines. Coordination of specialist assessment and public participation in terms of overall EIA process.
- **Transnet New Multi-Products Pipeline (NMPP) EMP Durban, Kwa Zulu-Natal to Jameson Park Near Heidelberg, South Africa (2008)**
  - Compiled the Environmental Management Plan (EMP) for the design, construction, operations and decommissioning phases of the NMPP project. This consisted of a new multi-products liquid fuel pipeline (or "Trunkline") running from Durban, Kwa Zulu-Natal to Jameson Park near Heidelberg in Gauteng, with a pump station at each terminal, and eight pump stations along the route. A coastal fuel terminal either at the Durban International Airport or and inland fuel terminal at Jameson Park near Heidelberg. The EMP ensured that recommendations of numerous specialists from a wide variety of fields were implemented. Following the compilation of a draft version of the EMP, I also facilitated a detailed workshop between the Contractor and the Client to establish that the mitigation measures proposed are feasible, following which the EMP was amended as required.
- **City of Tshwane KH2 and KK1,2,3 Pipelines Pretoria, South Africa (2008)**
  - Various environmental processes to obtain authorisation for the installation of the proposed pipeline. Amendment and update of detailed Environmental Management plan for planning, Construction and Operation phases.
- **The Hills and Sammy Marx lifestyle estates Water Use Licence Applications East of Pretoria, South Africa (2008 and 2013)**
  - Water use licence applications for two extensive mixed use lifestyle estates.
- **Road D419 EIA North West Province, South Africa (2005)**
  - EMP for the construction of road D419, including extensive addressing of erosion prevention and mitigation. EIA Scoping report for the proposed D419 Road between the two Lekgophung and Swartkopfontein in the Northwest Province. The distance between the two termini of the road (approximately 15 km) required extensive consideration of several alignment option and extensive public participation.
- **The Hills Estate Pretoria, South Africa (2004)**
  - EIA Scoping Report, EMP and various Water Use Licence Applications for “The Hills” mixed use development in Kungwini, east of Tshwane. This project was particularly complex due to the large extent of the site, large scale of the development and many environmental factors that had to be accommodated. The project includes single stands within an ecological conservation area, medium and high density residential and commercial sectors, resort and hotel

facilities, a golf course designed by Greg Norman and the Jacques Kallis cricket oval.

- **Menlyn Maine EMPs and environmental audits Pretoria, South Africa (2011-2013)**
  - Compiled Environmental Management Plans for the Menlyn Maine Clinton Climate Change Initiative-endorsed Phase 1 infrastructure development as well as Falcon, Epsilon and Pegasus Buildings; and conducted construction environmental compliance audits. All projects are targeting a minimum Green Star SA four star rating; and LEED ND certification.

PUBLICATIONS

Hattingh, R and Bothma, J. 2013. Taking the risk out of a risky business: a land use approach to closure planning, in Mine Closure 2013. Edited by M. Tibbett, A.B. Fourie and C. Dogby. Australian Centre for Geomechanics: Perth.

Bothma, J. and Theron, G. 2012. Human comfort and the South African climate design regions in terms of small-scale development design, in South African Landscape Architecture - a Reader. Pretoria: Unisa Press.

Bothma, J., Crockett, D. and Southwood, J. 2012. Siting a building for human comfort, on SABMag homepage. [Online] Available: www.sabmagazine.com/blog/2011/12/21/siting-a-building-for-human-comfort/

Bothma, J. 2011. Greening the building: Plants, planting and detailing, in Green Building Handbook South Africa - the Essential Guide Volume 3. Edited by L. Var Wyk, Capte Town. Alive2green (pp209-226)

Bothma, J. 2010. Siting a building for Human Comfort, in Green Building Handbook South Africa - The Essential Guide Volume 2. Edited by L.V.Wyk, Cap Town Alive2green (pp57-72)

Theron, G. and Bothma, J. 2009. The Ecology of Building and Landscape Design in Green Building Handbook South Africa Volume 1: A Guide to Ecological Design. Edited by L. van Wyk, Cape Town: Alive2green cc (pp61-75).

Bothma, J. 2004. “Landscape and Architectural Devices for Energy-Efficient Sout African Suburban Residential Design” Submitted in partial fulfilment of the requirements for the degree Master of Landscape Architecture. Pretoria: University of Pretoria.

Education

MSc(Eng) Mining Engineering, University of Witwatersrand, (Current, expected date of completion 2019)

B Tech Civil Engineering, Tshwane University of Technology, Pretoria, 2012

Languages

English – Fluent

Afrikaans – Fluent

Professional Affiliations

ECSA registration in progress

Douglas Richards

Environmental Engineer

PROFESSIONAL SUMMARY

Mine Environment

Douglas has practical experience in the field of civil engineering over a period of 7 years. During this period, he was involved in a variety of environmental engineering related projects in the mining sector and specialises in landform designs during and post mining operations, cover and dump design, selective material movement strategies, stockpile deposition strategies, slope stability analysis, stormwater management, rehabilitation planning, wetland rehabilitation and offsetting and mine closure costing.

PROJECT EXPERIENCE WITH A PRIMARY FOCUS ON LANDFORM DESIGN AND THAT INCLUDED SOME OR ALL OF THE ABOVE ASPECTS

- Venture discard dump design and rehabilitation design for construction for Glencore, Impunzi (2018)
- More than 30 designs for open cast pit rehabilitation for long term planning and implementation purposes for BHP Billiton, South32, Glencore, Exxaro, Xstrata, Universal Coal and other junior mining companies (2010 – 2018)
- Wetland interventions/rehabilitation measures and offsetting strategies for several mines including Anglo, Sout32, Exxaro and Glencore (2016-2018)
- McCain Delmas Landform designs and remediation of existing stormwater dams (2016 – 2018)
- Tubatse slag deposition strategy (2017)
- Lafarge Nigeria Conceptual Landform designs (2017)
- Sasol dam 5 and 6 (Nitro) rehabilitation (landform designs) and stormwater measures (2017)
- Coarse discard dump and pit rehabilitation design for construction for Inyanda, Exxaro (2014)
- Coarse discard dump and pit rehabilitation design for construction for Tshikondeni, Exxaro (2014)
- Conceptual Post Mining Landform Designs for open cast pit rehabilitation of four BECSA mines: Middelburg, Wolwekrans, Klipspruit and Khutala Collieries as a Basis for Rehabilitation Planning (2013)
- Optimum Koornfontein deposition strategy and stormwater measures (2013)
- Conceptual long-term rehabilitation planning to inform detailed designs for rehabilitation and selective materials movement during the operational phase of Block A at Khutala Colliery (2012)

APPENDIX B

GN.R. 1147 checklist - contents of an annual rehabilitation plan

1.0 NEMA GN R. 1147 CHECK-LIST (APPENDIX 3)

The required content of the annual rehabilitation plan is detailed in Table B1, which also provides cross references to the relevant sections where these requirements are addressed.

Table B1: Content of annual rehabilitation plan (GN R. 1147 Appendix 3)

Content of an annual rehabilitation plan	Reference to section
(a) Details of- (i) The person or persons who prepared the plan; (ii) The professional registrations and experience of the preparers; (iii) Timeframes of implementation of the current, and review of the previous rehabilitation activities	Refer to section 1.0
(b) the pertinent environmental and project context relating directly to the planned annual rehabilitation and remediation activity;	Refer to Section 9.0
(c) results of monitoring of risks identified in the final rehabilitation, decommissioning and mine closure plan with a view to informing rehabilitation and remediation activities;	Not applicable – mining yet to commence
(d) an identification of shortcomings experienced in the preceding 12 months;	Not applicable – no mining has taken place yet
(e) Details of the planned annual rehabilitation and remediation activities or measures for the forthcoming 12 months, including those which will address the shortcomings contemplated in (d) above or which were identified from monitoring in the preceding 12 months, and including- (i) If no areas are available for annual rehabilitation and remediation concurrent with mining, an indication to that effect and motivation why no annual rehabilitation or remediation can be undertaken;	Refer to Section 9.2, Table 9 and Table 10
(ii) Where areas are available for annual rehabilitation and remediation concurrent with mining, annual rehabilitation and remediation activities related to previous disturbance or expected planned impacts and disturbance, as per the mine works programme, in the period under consideration, which should be tabulated and must indicate, but not necessarily be limited to: (aa) Nature or type of activity and associated infrastructure; (bb) Planned remaining life of the activity under consideration; (cc) Area already disturbed or planned to be disturbed in the period of review; (dd) Percentage of the already disturbed or planned to be disturbed area available for concurrent rehabilitation and remediation activities; (ee) Percentage of the already disturbed or planned to be disturbed area available as per (dd) and on which concurrent rehabilitation and remediation can be undertaken; (ff) Notes to indicate why total available or planned to be available area differs from area already disturbed or planned to be disturbed; (gg) Notes to indicate why concurrent rehabilitation will not be undertaken on the full available or planned to be available area; (hh) Details of rehabilitation activity planned on this area for the period of review;	Refer to Section 9.2 and 9.3
(iii) the pertinent closure objectives and performance targets that will be addressed in the forthcoming year, which objectives and targets	Refer to Section 9.4 and 9.5

Content of an annual rehabilitation plan	Reference to section
are aligned to the final rehabilitation, decommissioning and mine closure plan; (iv) description of the relevant closure design criteria adopted in the annual rehabilitation and remediation activities and the expected final land use once all rehabilitation and remediation activities are complete for the activity or aspect; and	Refer to section 4.0
(v) a site plan indicating at least the total area disturbed, area available for rehabilitation and remediation and the area to be rehabilitated or remediated per aspect or activity;	Refer to the predicted mined out landform figures Figure 7, Figure 9, Figure 11, Figure 13 and Figure 15. Currently there are no disturbed areas.
(f) A review of the previous year's annual rehabilitation and remediation activities, indicating a comparison between activities planned in the previous year's annual rehabilitation and remediation plan and actual rehabilitation and remediation implemented, which should be tabulated and as a minimum contain- (aa) area planned to be rehabilitated and remediated during the plan under review; (bb) actual area rehabilitation or remediated; and (cc) if the variance between planned and actual exceeds 15%, motivation indicating reasons for the inability to rehabilitate or remediate the full area; and	Not applicable, as this is the first annual rehabilitation plan in terms of GN R. 1147
(g) costing, including- (i) an explanation of the closure cost methodology; (ii) auditable calculations of costs per activity or infrastructure; (iii) cost assumptions; and (iv) monitoring and maintenance costs likely to be incurred both during the period of the annual rehabilitation plan and those that will extend past the period of the final rehabilitation, decommissioning and mine closure plan, on condition that the monitoring and maintenance costs included in previous annual rehabilitation plans must be accumulated into subsequent versions of the annual rehabilitation plan until such time as the monitoring and maintenance obligation is discharged.	Refer to Section 7.0 and Table 9

APPENDIX C

Closure cost tables

18102155 MRA 5 opencast pits Closure Costs, as at February 2019										
Mona Lisa										
Ref.		Closure Component (Select View)	Life of Pit Rehabilitation costing							
			Applicable	Quantity	Unit	Unit rate code	Unit rate	Total cost	Notes	
		Mona Lisa								
	1	**Infrastructural Areas**								
	1.1	**Dismantling of processing plant and related structures**								
	1.1.1	Not applicable	No	0	N/A	L1	R 0.00	R 0.00		
		Sub-total for Dismantling of processing plant and related structures						**R 0.00**		
		Sub-total for Infrastructural Areas						**R 0.00**		
	2	**Mining Areas**								
	2.1	**Open pit rehabilitation including final voids and ramps**								
	2.1.1	Concurrent backfill	No	467,220	/m3	N3	R 16.56	R 0.00	Opex, no liability	
	2.1.2	Backfill final void from stockpile	Yes	221,588	/m3	N3	R 16.56	R 3,669,497.28	final void backfill (one third of pit)	
	2.1.3	Bulked volumed removed from site (23% of pit volume)	No	158,426	N/A	L1	R 0.00	R 0.00	removed by 3rd party - 23% total pit volume)	
	2.1.4	Topsoil placement from stockpile	Yes	10831.38	/m3	N3	R 16.56	R 179,367.65	calculated from depth supplied	
	2.1.5	Rip and scarify	Yes	5.575395	/ha	N1	R 6,800.00	R 37,912.69	Hydromulch spec	
	2.1.6	hydroseed areas	Yes	5.575395	/ha	N2	R 34,200.00	R 190,678.51	no hydroseding - development area	
		Sub-total for Open pit rehabilitation including final voids and ramps						**R 4,077,456.13**		
	2.2	**Rehabilitation of Topsoil berm stockpile footprint**								
	2.2.1	Rip and scarify	Yes	0.4	/ha	N1	R 6,800.00	R 2,974.32	Hydromulch spec	
	2.2.2	hydroseed areas	Yes	0.4	/ha	N2	R 34,200.00	R 14,959.08	no hydroseding - development area	
		Sub-total for Rehabilitation of Topsoil berm stockpile footprint						**R 17,933.40**		
	2.3	**Rehabilitation of Overburden/platform stockpile footprint**								
	2.3.1	Topsoil placement from stockpile	Yes		/m3	N3	R 16.56	R 0.00	included above	
	2.3.2	Rip and scarify	Yes	3.894	/ha	N1	R 6,800.00	R 26,479.20	Hydromulch spec	
	2.3.3	hydroseed areas	Yes	3.894	/ha	N2	R 34,200.00	R 133,174.80	no hydroseding - development area	
		Sub-total for Rehabilitation of Overburden/platform stockpile footprint						**R 159,654.00**		
	2.4	**Rehabilitation of haul roads**								
	2.4.1	Haul road rehabilitation	No	0	/m2	E4	R 10.53	R 0.00	Haul roads remain development/access	
		Sub-total for Rehabilitation of haul roads						**R 0.00**		
		Sub-total for Mining Areas						**R 4,255,043.53**		
	3	**General Surface Rehabilitation**								
	3.1	**Infrastructural Areas**								
	3.1.1	Not applicable	No	0	/m3	N4	R 16.56	R 0.00		
		Sub-total for Infrastructural Areas						**R 0.00**		
		Sub-total for General Surface Rehabilitation						**R 0.00**		
	4	**Surface water reinstatement**								
	4.1	**Reinstatement of drainage lines**								
	4.1.1	Rehabilitate storm water measures and reinstate drainage lines	Yes	9.91	/ha	G3.1	R 5,813.26	R 57,590.78	trenching and small berms	
		Sub-total for Reinstatement of drainage lines						**R 57,590.78**		
	4.2	**Insert borehole into backfilled pit**								
	4.2.1	Drilling of general boreholes (< 35m)	No	1	/unit	G3.4.1	R 58,322.18	R 0.00	use existing boreholes (no inpit)	
		Sub-total for Insert borehole into backfilled pit						**R 0.00**		
		Sub-total for Surface water reinstatement						**R 57,590.78**		
		Sub-Total 1 (for infrastructure and related aspects)						**R 4,312,634.30**		
	5	**P&Gs, Contingencies and Additional Allowances**								
	5.1	Preliminaries and general	Yes	10	/sum	L2	R 431,263.43	R 431,263.43	Assumed 10 % of Sub-total 1	
	5.2	Contingencies	Yes	5	/sum	L2	R 215,631.72	R 215,631.72	Assumed 5 % of Sub-total 1	
	5.3	Compiling the final closure report and regulatory submissions	No	1	/sum	N6	R 208,792.50	R 0.00	Additional studies?	
		Sub-Total 2 (for Additional Allowances)						**R 646,895.15**		
	6	**Pre-site Relinquishment Monitoring and Aftercare**								
	6.1	Surface water quality monitoring and reporting	No	5	/yr	K1	R 47,035.43	R 0.00	MRA opex	
	6.2	Groundwater quality monitoring, reporting and model updates	No	5	/yr	K2	R 64,192.45	R 0.00	MRA opex	
	6.3	Rehabilitation monitoring (vegetation, soils, land capability)	Yes	3	/yr	N5	R 70,574.00	R 211,722.00	MRA opex	
	6.4	Care and maintenance of rehabilitated areas	Yes	9.91	ha/3yrs	J2	R 34,202.90	R 338,841.12	annual rate	
	6.5	Contingencies for post-closure aspects	Yes	1	/sum	L2	R 55,056.31	R 55,056.31	assumed 10% of care and maintenance	
		Sub-Total 3 (for Post-Closure aspects)						**R 605,619.43**		
		Grand Total Excl. VAT. (for Sub-total 1 +2 +3)						**R 5,565,148.88**		

18102155 MRA 5 opencast pits Closure Costs, as at February 2019										
11 Shaft										
Ref.		Closure Component (Select View)	Life of Pit Rehabilitation costing							
			Applicable	Quantity	Unit	Unit rate code	Unit rate	Total cost	Notes	
		11 Shaft								
	1	**Infrastructural Areas**								
	1.1	**Dismantling of processing plant and related structures**								
	1.1.1	Not applicable	No	0	N/A	L1	R 0.00	R 0.00		
		Sub-total for Dismantling of processing plant and related structures						**R 0.00**		
		Sub-total for Infrastructural Areas						**R 0.00**		
	2	**Mining Areas**								
	2.1	**Open pit rehabilitation including final voids and ramps**								
	2.1.1	Concurrent backfill	No	375,793	/m3	N3	R 16.56	R 0.00	Opex, no liability	
	2.1.2	Backfill final void from stockpile	Yes	155,083	/m3	N3	R 16.56	R 2,568,174.48	final void backfill (one third of pit)	
	2.1.3	Bulked volumed removed from site (23% of pit volume)	No	122,102	N/A	L1	R 0.00	R 0.00	removed by 3rd party - 23% total pit volume)	
	2.1.4	Topsoil placement from stockpile	Yes	33125.52	/m3	N3	R 16.56	R 548,558.61	calculated from depth supplied	
	2.1.5	Rip and scarify	Yes	3.40998	/ha	N1	R 6,800.00	R 23,187.86	Hydromulch spec	
	2.1.6	hydroseed areas	Yes	3.40998	/ha	N2	R 34,200.00	R 116,621.32	no hydroseding - development area	
		Sub-total for Open pit rehabilitation including final voids and ramps						**R 3,256,542.27**		
	2.2	**Rehabilitation of Topsoil berm stockpile footprint**								
	2.2.1	Rip and scarify	Yes	0.3	/ha	N1	R 6,800.00	R 2,185.52	Hydromulch spec	
	2.2.2	hydroseed areas	Yes	0.3	/ha	N2	R 34,200.00	R 10,991.88	no hydroseding - development area	
		Sub-total for Rehabilitation of Topsoil berm stockpile footprint						**R 13,177.40**		
	2.3	**Rehabilitation of Overburden/platform stockpile footprint**								
	2.3.1	Topsoil placement from stockpile	Yes		/m3	N3	R 16.56	R 0.00	included above	
	2.3.2	Rip and scarify	Yes	3.4887	/ha	N1	R 6,800.00	R 23,723.16	Hydromulch spec	
	2.3.3	hydroseed areas	Yes	3.4887	/ha	N2	R 34,200.00	R 119,313.54	no hydroseding - development area	
		Sub-total for Rehabilitation of Overburden/platform stockpile footprint						**R 143,036.70**		
	2.4	**Rehabilitation of haul roads**								
	2.4.1	Haul road rehabilitation	No		/m2	E4	R 10.53	R 0.00	Haul roads remain development/access	
		Sub-total for Rehabilitation of haul roads						**R 0.00**		
		Sub-total for Mining Areas						**R 3,412,756.37**		
	3	**General Surface Rehabilitation**								
	3.1	**Infrastructural Areas**								
	3.1.1	Not applicable	No		/m3	N4	R 16.56	R 0.00		
		Sub-total for Infrastructural Areas						**R 0.00**		
		Sub-total for General Surface Rehabilitation						**R 0.00**		
	4	**Surface water reinstatement**								
	4.1	**Reinstatement of drainage lines**								
	4.1.1	Rehabilitate storm water measures and reinstate drainage lines	Yes	7.22	/ha	G3.1	R 5,813.26	R 41,972.20	trenching and small berms	
		Sub-total for Reinstatement of drainage lines						**R 41,972.20**		
	4.2	**Insert borehole into backfilled pit**								
	4.2.1	Drilling of general boreholes (< 35m)	No	1	/unit	G3.4.1	R 58,322.18	R 0.00	use existing boreholes (no inpit)	
		Sub-total for Insert borehole into backfilled pit						**R 0.00**		
		Sub-total for Surface water reinstatement						**R 41,972.20**		
		Sub-Total 1 (for infrastructure and related aspects)						**R 3,454,728.57**		
	5	**P&Gs, Contingencies and Additional Allowances**								
	5.1	Preliminaries and general	Yes	10	/sum	L2	R 345,472.86	R 345,472.86	Assumed 10 % of Sub-total 1	
	5.2	Contingencies	Yes	5	/sum	L2	R 172,736.43	R 172,736.43	Assumed 5 % of Sub-total 1	
	5.3	Compiling the final closure report and regulatory submissions	No	1	/sum	N6	R 208,792.50	R 0.00	Additional studies?	
		Sub-Total 2 (for Additional Allowances)						**R 518,209.29**		
	6	**Pre-site Relinquishment Monitoring and Aftercare**								
	6.1	Surface water quality monitoring and reporting	No	5	/yr	K1	R 47,035.43	R 0.00	MRA opex	
	6.2	Groundwater quality monitoring, reporting and model updates	No	5	/yr	K2	R 64,192.45	R 0.00	MRA opex	
	6.3	Rehabilitation monitoring (vegetation, soils, land capability)	Yes	3	/yr	N5	R 70,574.00	R 211,722.00	MRA opex	
	6.4	Care and maintenance of rehabilitated areas	Yes	7.22	ha/3yrs	J2	R 34,202.90	R 246,947.67	annual rate	
	6.5	Contingencies for post-closure aspects	Yes	1	/sum	L2	R 45,866.97	R 45,866.97	assumed 10% of care and maintenance	
		Sub-Total 3 (for Post-Closure aspects)						**R 504,536.64**		
		Grand Total Excl. VAT. (for Sub-total 1 +2 +3)						**R 4,477,474.50**		

18102155 MRA 5 opencast pits Closure Costs, as at February 2019										
Roodepoort										
Ref.		Closure Component (Select View)	Life of Pit Rehabilitation costing							
			Applicable	Quantity	Unit	Unit rate code	Unit rate	Total cost	Notes	
		Roodepoort								
	1	**Infrastructural Areas**								
	1.1	**Dismantling of processing plant and related structures**								
	1.1.1	Not applicable	No	0	N/A	L1	R 0.00	R 0.00		
		Sub-total for Dismantling of processing plant and related structures						**R 0.00**		
		Sub-total for Infrastructural Areas						**R 0.00**		
	2	**Mining Areas**								
	2.1	**Open pit rehabilitation including final voids and ramps**								
	2.1.1	Concurrent backfill	No	540,875	/m3	N3	R 16.56	R 0.00	Opex, no liability	
	2.1.2	Backfill final void from stockpile	Yes	267,763	/m3	N3	R 16.56	R 4,434,155.28	final void backfill (one third of pit)	
	2.1.3	Bulked volumed removed from site (23% of pit volume)	No	227,151	N/A	L1	R 0.00	R 0.00	removed by 3rd party - 23% total pit volume)	
	2.1.4	Topsoil placement from stockpile	Yes	40109.46	/m3	N3	R 16.56	R 664,212.66	calculated from depth supplied	
	2.1.5	Rip and scarify	Yes	6.746565	/ha	N1	R 6,800.00	R 45,876.64	Hydromulch spec	
	2.1.6	hydroseed areas	Yes	6.746565	/ha	N2	R 34,200.00	R 230,732.52	no hydroseding - development area	
		Sub-total for Open pit rehabilitation including final voids and ramps						**R 5,374,977.10**		
	2.2	**Rehabilitation of Topsoil berm stockpile footprint**								
	2.2.1	Rip and scarify	Yes	0.9	/ha	N1	R 6,800.00	R 5,809.24	Hydromulch spec	
	2.2.2	hydroseed areas	Yes	0.9	/ha	N2	R 34,200.00	R 29,217.06	no hydroseding - development area	
		Sub-total for Rehabilitation of Topsoil berm stockpile footprint						**R 35,026.30**		
	2.3	**Rehabilitation of Overburden/platform stockpile footprint**								
	2.3.1	Topsoil placement from stockpile	Yes		/m3	N3	R 16.56	R 0.00	included above	
	2.3.2	Rip and scarify	Yes	5.5387	/ha	N1	R 6,800.00	R 37,663.16	Hydromulch spec	
	2.3.3	hydroseed areas	Yes	5.5387	/ha	N2	R 34,200.00	R 189,423.54	no hydroseding - development area	
		Sub-total for Rehabilitation of Overburden/platform stockpile footprint						**R 227,086.70**		
	2.4	**Rehabilitation of haul roads**								
	2.4.1	Haul road rehabilitation	No		/m2	E4	R 10.53	R 0.00	Haul roads remain development/access	
		Sub-total for Rehabilitation of haul roads						**R 0.00**		
		Sub-total for Mining Areas						**R 5,637,090.10**		
	3	**General Surface Rehabilitation**								
	3.1	**Infrastructural Areas**								
	3.1.1	Not applicable	No		/m3	N4	R 16.56	R 0.00		
		Sub-total for Infrastructural Areas						**R 0.00**		
		Sub-total for General Surface Rehabilitation						**R 0.00**		
	4	**Surface water reinstatement**								
	4.1	**Reinstatement of drainage lines**								
	4.1.1	Rehabilitate storm water measures and reinstate drainage lines	Yes	13.14	/ha	G3.1	R 5,813.26	R 76,383.71	trenching and small berms	
		Sub-total for Reinstatement of drainage lines						**R 76,383.71**		
	4.2	**Insert borehole into backfilled pit**								
	4.2.1	Drilling of general boreholes (< 35m)	No	1	/unit	G3.4.1	R 58,322.18	R 0.00	use existing boreholes (no inpit)	
		Sub-total for Insert borehole into backfilled pit						**R 0.00**		
		Sub-total for Surface water reinstatement						**R 76,383.71**		
		Sub-Total 1 (for infrastructure and related aspects)						**R 5,713,473.81**		
	5	**P&Gs, Contingencies and Additional Allowances**								
	5.1	Preliminaries and general	Yes	10	/sum	L2	R 571,347.38	R 571,347.38	Assumed 10 % of Sub-total 1	
	5.2	Contingencies	Yes	5	/sum	L2	R 285,673.69	R 285,673.69	Assumed 5 % of Sub-total 1	
	5.3	Compiling the final closure report and regulatory submissions	No	1	/sum	N6	R 208,792.50	R 0.00	Additional studies?	
		Sub-Total 2 (for Additional Allowances)						**R 857,021.07**		
	6	**Pre-site Relinquishment Monitoring and Aftercare**								
	6.1	Surface water quality monitoring and reporting	No	5	/yr	K1	R 47,035.43	R 0.00	MRA opex	
	6.2	Groundwater quality monitoring, reporting and model updates	No	5	/yr	K2	R 64,192.45	R 0.00	MRA opex	
	6.3	Rehabilitation monitoring (vegetation, soils, land capability)	Yes	3	/yr	N5	R 70,574.00	R 211,722.00	MRA opex	
	6.4	Care and maintenance of rehabilitated areas	Yes	13.14	ha/3yrs	J2	R 34,202.90	R 449,411.23	annual rate	
	6.5	Contingencies for post-closure aspects	Yes	1	/sum	L2	R 66,113.32	R 66,113.32	assumed 10% of care and maintenance	
		Sub-Total 3 (for Post-Closure aspects)						**R 727,246.55**		
		Grand Total Excl. VAT. (for Sub-total 1 +2 +3)						**R 7,297,741.43**		

18102155 MRA 5 opencast pits Closure Costs, as at February 2019										
RugbyClub										
Ref.		Closure Component (Select View)	Life of Pit Rehabilitation costing							
			Applicable	Quantity	Unit	Unit rate code	Unit rate	Total cost	Notes	
		RugbyClub								
	1	**Infrastructural Areas**								
	1.1	**Dismantling of processing plant and related structures**								
	1.1.1	Not applicable	No	0	N/A	L1	R 0.00	R 0.00		
		Sub-total for Dismantling of processing plant and related structures						**R 0.00**		
		Sub-total for Infrastructural Areas						**R 0.00**		
	2	**Mining Areas**								
	2.1	**Open pit rehabilitation including final voids and ramps**								
	2.1.1	Concurrent backfill	No	61,922	/m3	N3	R 16.56	R 0.00	Opex, no liability	
	2.1.2	Backfill final void from stockpile	Yes	22,371	/m3	N3	R 16.56	R 370,463.76	final void backfill (one third of pit)	
	2.1.3	Bulked volumed removed from site (23% of pit volume)	No	19,388	N/A	L1	R 0.00	R 0.00	removed by 3rd party - 23% total pit volume)	
	2.1.4	Topsoil placement from stockpile	Yes	7028.82	/m3	N3	R 16.56	R 116,397.26	calculated from depth supplied	
	2.1.5	Rip and scarify	Yes	0.723555	/ha	N1	R 6,800.00	R 4,920.17	Hydromulch spec	
	2.1.6	hydroseed areas	Yes	0.723555	/ha	N2	R 34,200.00	R 24,745.58	no hydroseding - development area	
		Sub-total for Open pit rehabilitation including final voids and ramps						**R 516,526.77**		
	2.2	**Rehabilitation of Topsoil berm stockpile footprint**								
	2.2.1	Rip and scarify	Yes	0.2	/ha	N1	R 6,800.00	R 1,655.80	Hydromulch spec	
	2.2.2	hydroseed areas	Yes	0.2	/ha	N2	R 34,200.00	R 8,327.70	no hydroseding - development area	
		Sub-total for Rehabilitation of Topsoil berm stockpile footprint						**R 9,983.50**		
	2.3	**Rehabilitation of Overburden/platform stockpile footprint**								
	2.3.1	Topsoil placement from stockpile	Yes		/m3	N3	R 16.56	R 0.00	included above	
	2.3.2	Rip and scarify	Yes	0.8285	/ha	N1	R 6,800.00	R 5,633.80	Hydromulch spec	
	2.3.3	hydroseed areas	Yes	0.8285	/ha	N2	R 34,200.00	R 28,334.70	no hydroseding - development area	
		Sub-total for Rehabilitation of Overburden/platform stockpile footprint						**R 33,968.50**		
	2.4	**Rehabilitation of haul roads**								
	2.4.1	Haul road rehabilitation	No		/m2	E4	R 10.53	R 0.00	Haul roads remain development/access	
		Sub-total for Rehabilitation of haul roads						**R 0.00**		
		Sub-total for Mining Areas						**R 560,478.77**		
	3	**General Surface Rehabilitation**								
	3.1	**Infrastructural Areas**								
	3.1.1	Not applicable	No		/m3	N4	R 16.56	R 0.00		
		Sub-total for Infrastructural Areas						**R 0.00**		
		Sub-total for General Surface Rehabilitation						**R 0.00**		
	4	**Surface water reinstatement**								
	4.1	**Reinstatement of drainage lines**								
	4.1.1	Rehabilitate storm water measures and reinstate drainage lines	Yes	1.80	/ha	G3.1	R 5,813.26	R 10,438.03	trenching and small berms	
		Sub-total for Reinstatement of drainage lines						**R 10,438.03**		
	4.2	**Insert borehole into backfilled pit**								
	4.2.1	Drilling of general boreholes (< 35m)	No	1	/unit	G3.4.1	R 58,322.18	R 0.00	use existing boreholes (no inpit)	
		Sub-total for Insert borehole into backfilled pit						**R 0.00**		
		Sub-total for Surface water reinstatement						**R 10,438.03**		
		Sub-Total 1 (for infrastructure and related aspects)						**R 570,916.80**		
	5	**P&Gs, Contingencies and Additional Allowances**								
	5.1	Preliminaries and general	Yes	10	/sum	L2	R 57,091.68	R 57,091.68	Assumed 10 % of Sub-total 1	
	5.2	Contingencies	Yes	5	/sum	L2	R 28,545.84	R 28,545.84	Assumed 5 % of Sub-total 1	
	5.3	Compiling the final closure report and regulatory submissions	No	1	/sum	N6	R 208,792.50	R 0.00	Additional studies?	
		Sub-Total 2 (for Additional Allowances)						**R 85,637.52**		
	6	**Pre-site Relinquishment Monitoring and Aftercare**								
	6.1	Surface water quality monitoring and reporting	No	5	/yr	K1	R 47,035.43	R 0.00	MRA opex	
	6.2	Groundwater quality monitoring, reporting and model updates	No	5	/yr	K2	R 64,192.45	R 0.00	MRA opex	
	6.3	Rehabilitation monitoring (vegetation, soils, land capability)	Yes	3	/yr	N5	R 70,574.00	R 211,722.00	MRA opex	
	6.4	Care and maintenance of rehabilitated areas	Yes	1.80	ha/3yrs	J2	R 34,202.90	R 61,413.19	annual rate	
	6.5	Contingencies for post-closure aspects	Yes	1	/sum	L2	R 27,313.52	R 27,313.52	assumed 10% of care and maintenance	
		Sub-Total 3 (for Post-Closure aspects)						**R 300,448.71**		
		Grand Total Excl. VAT. (for Sub-total 1 +2 +3)						**R 957,003.03**		

18102155 MRA 5 opencast pits Closure Costs, as at February 2019										
KimberlyEast										
Ref.		Closure Component (Select View)	Life of Pit Rehabilitation costing							
			Applicable	Quantity	Unit	Unit rate code	Unit rate	Total cost	Notes	
		KimberlyEast								
	1	**Infrastructural Areas**								
	1.1	**Dismantling of processing plant and related structures**								
	1.1.1	Not applicable	No	0	N/A	L1	R 0.00	R 0.00		
		Sub-total for Dismantling of processing plant and related structures						**R 0.00**		
		Sub-total for Infrastructural Areas						**R 0.00**		
	2	**Mining Areas**								
	2.1	**Open pit rehabilitation including final voids and ramps**								
	2.1.1	Concurrent backfill	No	147,346	/m3	N3	R 16.56	R 0.00	Opex, no liability	
	2.1.2	Backfill final void from stockpile	Yes	40,030	/m3	N3	R 16.56	R 662,896.80	final void backfill (one third of pit)	
	2.1.3	Bulked volumed removed from site (23% of pit volume)	No	43,097	N/A	L1	R 0.00	R 0.00	removed by 3rd party - 23% total pit volume)	
	2.1.4	Topsoil placement from stockpile	Yes	7385.82	/m3	N3	R 16.56	R 122,309.18	calculated from depth supplied, additional 2% allowed for to protect pit edges	
	2.1.5	Rip and scarify	Yes	1.67307	/ha	N1	R 6,800.00	R 11,376.88	Hydromulch spec	
	2.1.6	hydroseed areas	Yes	1.67307	/ha	N2	R 34,200.00	R 57,218.99	no hydroseding - development area	
		Sub-total for Open pit rehabilitation including final voids and ramps						**R 853,801.85**		
	2.2	**Rehabilitation of Topsoil berm stockpile footprint**								
	2.2.1	Rip and scarify	Yes	0.5	/ha	N1	R 6,800.00	R 3,188.52	Hydromulch spec	
	2.2.2	hydroseed areas	Yes	0.5	/ha	N2	R 34,200.00	R 16,036.38	no hydroseding - development area	
		Sub-total for Rehabilitation of Topsoil berm stockpile footprint						**R 19,224.90**		
	2.3	**Rehabilitation of Overburden/platform stockpile footprint**								
	2.3.1	Topsoil placement from stockpile	Yes		/m3	N3	R 16.56	R 0.00	included above	
	2.3.2	Rip and scarify	Yes	1.3052	/ha	N1	R 6,800.00	R 8,875.36	Hydromulch spec	
	2.3.3	hydroseed areas	Yes	1.3052	/ha	N2	R 34,200.00	R 44,637.84	no hydroseding - development area	
		Sub-total for Rehabilitation of Overburden/platform stockpile footprint						**R 53,513.20**		
	2.4	**Rehabilitation of haul roads**								
	2.4.1	Haul road rehabilitation	No		/m2	E4	R 10.53	R 0.00	Haul roads remain development/access	
		Sub-total for Rehabilitation of haul roads						**R 0.00**		
		Sub-total for Mining Areas						**R 926,539.95**		
	3	**General Surface Rehabilitation**								
	3.1	**Infrastructural Areas**								
	3.1.1	Not applicable	No		/m3	N4	R 16.56	R 0.00		
		Sub-total for Infrastructural Areas						**R 0.00**		
		Sub-total for General Surface Rehabilitation						**R 0.00**		
	4	**Surface water reinstatement**								
	4.1	**Reinstatement of drainage lines**								
	4.1.1	Rehabilitate storm water measures and reinstate drainage lines	Yes	3.45	/ha	G3.1	R 5,813.26	R 20,039.30	trenching and small berms	
		Sub-total for Reinstatement of drainage lines						**R 20,039.30**		
	4.2	**Insert borehole into backfilled pit**								
	4.2.1	Drilling of general boreholes (< 35m)	No	1	/unit	G3.4.1	R 58,322.18	R 0.00	use existing boreholes (no inpit)	
		Sub-total for Insert borehole into backfilled pit						**R 0.00**		
		Sub-total for Surface water reinstatement						**R 20,039.30**		
		Sub-Total 1 (for infrastructure and related aspects)						**R 946,579.24**		
	5	**P&Gs, Contingencies and Additional Allowances**								
	5.1	Preliminaries and general	Yes	10	/sum	L2	R 94,657.92	R 94,657.92	Assumed 10 % of Sub-total 1	
	5.2	Contingencies	Yes	5	/sum	L2	R 47,328.96	R 47,328.96	Assumed 5 % of Sub-total 1	
	5.3	Compiling the final closure report and regulatory submissions	No	1	/sum	N6	R 208,792.50	R 0.00	Additional studies?	
		Sub-Total 2 (for Additional Allowances)						**R 141,986.89**		
	6	**Pre-site Relinquishment Monitoring and Aftercare**								
	6.1	Surface water quality monitoring and reporting	No	5	/yr	K1	R 47,035.43	R 0.00	MRA opex	
	6.2	Groundwater quality monitoring, reporting and model updates	No	5	/yr	K2	R 64,192.45	R 0.00	MRA opex	
	6.3	Rehabilitation monitoring (vegetation, soils, land capability)	Yes	3	/yr	N5	R 70,574.00	R 211,722.00	MRA opex	
	6.4	Care and maintenance of rehabilitated areas	Yes	3.45	ha/3yrs	J2	R 34,202.90	R 117,903.21	annual rate	
	6.5	Contingencies for post-closure aspects	Yes	1	/sum	L2	R 32,962.52	R 32,962.52	assumed 10% of care and maintenance	
		Sub-Total 3 (for Post-Closure aspects)						**R 362,587.73**		
		Grand Total Excl. VAT. (for Sub-total 1 +2 +3)						**R 1,451,153.86**		

APPENDIX D

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