

## **Future Coal (Pty) Ltd**

## **Chelmsford Colliery**

# **Closure and Rehabilitation Report**

**Incorporating the Annual (concurrent) rehabilitation plan**

**Final rehabilitation, decommissioning and closure plan**

**Environmental risk assessment**

**LICENCE NUMBER: 30/5/1/2/2/10006MR AND  
30/5/1/2/2/196 MR**

**September 2018**

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## TABLE OF CONTENTS

1	Introduction .....	1
1.1	Structure of the Report .....	3
1.2	Details of the Report Author .....	5
1.3	Organisational Structure and Capacity .....	6
1.3.1	Organisation Capacity .....	6
1.3.2	Current Financial Provision.....	7
2	Project Contextualisation .....	7
2.1	Project Location .....	7
2.2	Activity Description .....	8
2.3	Life of Mine Description and Closure Schedule .....	13
2.4	Summary of the Environmental and Social Context of the Project.....	15
2.5	Stakeholder Concerns.....	17
3	Legal Framework for Closure.....	18
3.1	Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) (as amended) .....	18
3.2	Minerals and Petroleum Resources Development Act, 2002 (MPRDA) (Act No. 28 of 2002) and its Regulations.....	19
3.3	National Environmental Management Act, 1998 (Act No. 107 of 1998) and EIA Regulations, 2014 (as amended) .....	19
3.4	National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEM:BA) and associated Regulations .....	20
3.5	National Environmental Management: Air Quality Act (NEM:AQA), Act 39 of 2004 as amended and associated regulations .....	20
3.6	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA) and its Regulations .....	20
3.7	National Water Act, 1998 (Act No. 36 of 1998) (NWA) and associated regulations.....	21
4	Environmental Risk Assessment to identify the closure strategy.....	21
4.1.1	Risk Assessment Methodology .....	21

4.1.2	Risk Identification and assessment .....	22
4.1.3	Identification of risk indicators and risk monitoring .....	27
5	Closure Objectives and Vision .....	28
5.1	Final Land Use .....	28
5.1.1	Post-mining Land Capability .....	34
5.2	Alternatives .....	36
5.3	Closure Actions .....	36
5.3.1	Infrastructure Removal .....	36
5.3.2	Soils and Vegetation.....	37
5.4	Relinquishment Criteria .....	37
6	Concurrent Rehabilitation Commitments .....	39
6.1	Shortcomings identified during the preceding 12 months .....	39
6.2	Planned rehabilitation for the forthcoming 12 months .....	39
7	Latent and Residual Impacts .....	42
7.1	Environmental risk assessment.....	42
7.2	AMD and decant from coal seams and overburden .....	43
7.3	Significance of latent risk .....	44
8	Assumptions, Limitations and Uncertainties .....	46
9	Monitoring, auditing and reporting requirements.....	46
10	Quantum of Financial Provision.....	51
10.1	Closure Cost Methodology .....	51
10.2	Closure Cost Estimate.....	52
11	Conclusion.....	53
12	References .....	54

## LIST OF TABLES

Table 1:	Project Summary .....	1
Table 2:	Reporting requirements and structure of this Report .....	3
Table 3:	Details of the Author.....	5

Table 4: Surface Right Ownership .....	7
Table 5: Description of the Mine Sections .....	10
Table 6: Validity and relevance of Mining Rights.....	13
Table 7: Environmental and Social Context.....	15
Table 8: Risk Criteria .....	22
Table 9: Risk Assessment: Decommissioning and Closure Phase .....	24
Table 10: Environmental Indicators and Monitoring.....	27
Table 11: Closure Actions and Objectives .....	31
Table 12: Action Plan for Soil Management .....	34
Table 13: Relinquishment Criteria .....	38
Table 14: Rehabilitation and remediation activities.....	40
Table 15: Risk Assessment Methodology.....	42
Table 16: Latent and residual risk assessment.....	44
Table 17: Summary of Auditing requirements.....	47
Table 18: Specific Monitoring Requirements.....	48
Table 19: Closure Cost Estimate Summary .....	52
Table 20: Rates used in the closure cost calculations.....	58

## LIST OF PLANS

Plan 1: Locality Map .....	55
Plan 2: Site Plan.....	55
Plan 3: Detailed Mine Plan .....	55
Plan 4: Proposed final post-closure land use .....	55

## LIST OF FIGURES

Figure 1: Regional Location of the Chelmsford Colliery .....	2
Figure 2: Future Coal and Chelmsford Colliery organisational structure.....	6
Figure 3: Layout of Chelmsford Colliery .....	12
Figure 4: Conceptual Life of Mine Schedule .....	14
Figure 5: Ashley Section, before rehabilitation in the event of immediate closure .....	29
Figure 6: Ashley Section, after rehabilitation in the event of immediate closure .....	29

Figure 7: Shelley Section, before rehabilitation in the event of immediate closure .....	30
Figure 8: Shelley Section, after rehabilitation in the event of immediate closure .....	30
Figure 9: Potential decant points .....	45
Figure 10: Monitoring Locations.....	50
Figure 11: Model details .....	52

## LIST OF ANNEXURES

Appendix A: A3 Maps and Plans .....	55
Appendix B: Detailed Closure Cost Calculations .....	56

## ACRONYMS AND ABBREVIATIONS

ACRONYM:	DESCRIPTION:
AMD	Acid Mine Drainage
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EMP	Environmental Management Plan
FP Regulations	Financial Provisioning Regulations, 2015 (as amended)
ha	Hectares
mamsl	metres above mean sea level
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MRA	Mining Right Area
NAEIS	National Atmospheric Emissions Inventory System
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NLM	Newcastle Local Municipality
PCD	Pollution Control Dam
PPP	Public Participation Process
ROM	Run of Mine
WMA	Water Management Area



## 1 Introduction

Cabanga has been contracted by Future Coal (Pty) Ltd (the Holder) to assess the quantum for financial provision for the Chelmsford Mine. Chelmsford Colliery is an existing, operational coal mine located in the Amajuba District Municipality and the Newcastle Local Municipality of the Kwa-Zulu Natal Province (Figure 1).

Two Mining Rights held by Future Coal (Pty) Ltd apply to the Chelmsford Colliery, namely:

- **30/5/1/2/2/10006MR**, comprising 2,963.1919 hectares over the Farm Exmoor No 8095, Remainder of the Farm Macclesfield No 8418, Portion 1 of the Farm Herons Court No 8521, the Remainder of Portion 1 and Portion 2 of the Farm Spectacle Spruit No 9079, the Remainder and Portions 1 and 2 of the Farm Mooi Krantz No 9562; and
- **30/5/1/2/2/196 MR**, comprising 2,023.9191 hectares over the Farm Forts No 8502, the Remainder of the Farm Herons Court No 8521, the Remainder of the Farm Chelmsford No 8642 and the Remainder of the Farm Hartebeest Bult No 9197.

The operation is divided into five Sections:

1. Ashley Section (active);
2. Shelley Section (active);
3. Macclesfield Section (the next development);
4. Mooikrantz Section; and
5. Exmoor and Spectacle Spruit Sections.

The Project Background is summarized in Table 1.

**Table 1: Project Summary**

<b>Holder of the Mining Right:</b>	Future Coal (Pty) Ltd
<b>Reference Number:</b>	30/5/1/2/2/10006MR and 30/5/1/2/2/196 MR
<b>Province:</b>	Kwa-Zulu Natal
<b>Municipality:</b>	Amajuba District, Newcastle Local Municipality
<b>Commodity:</b>	Coal
<b>Mining Method(s):</b>	Opencast Roll-over Mining, Underground bord-and-pillar
<b>Depth of mineral below surface</b>	From 5m to 92m
<b>Processing facilities:</b>	Crusher, screening, wash plant (at Ashley Section)

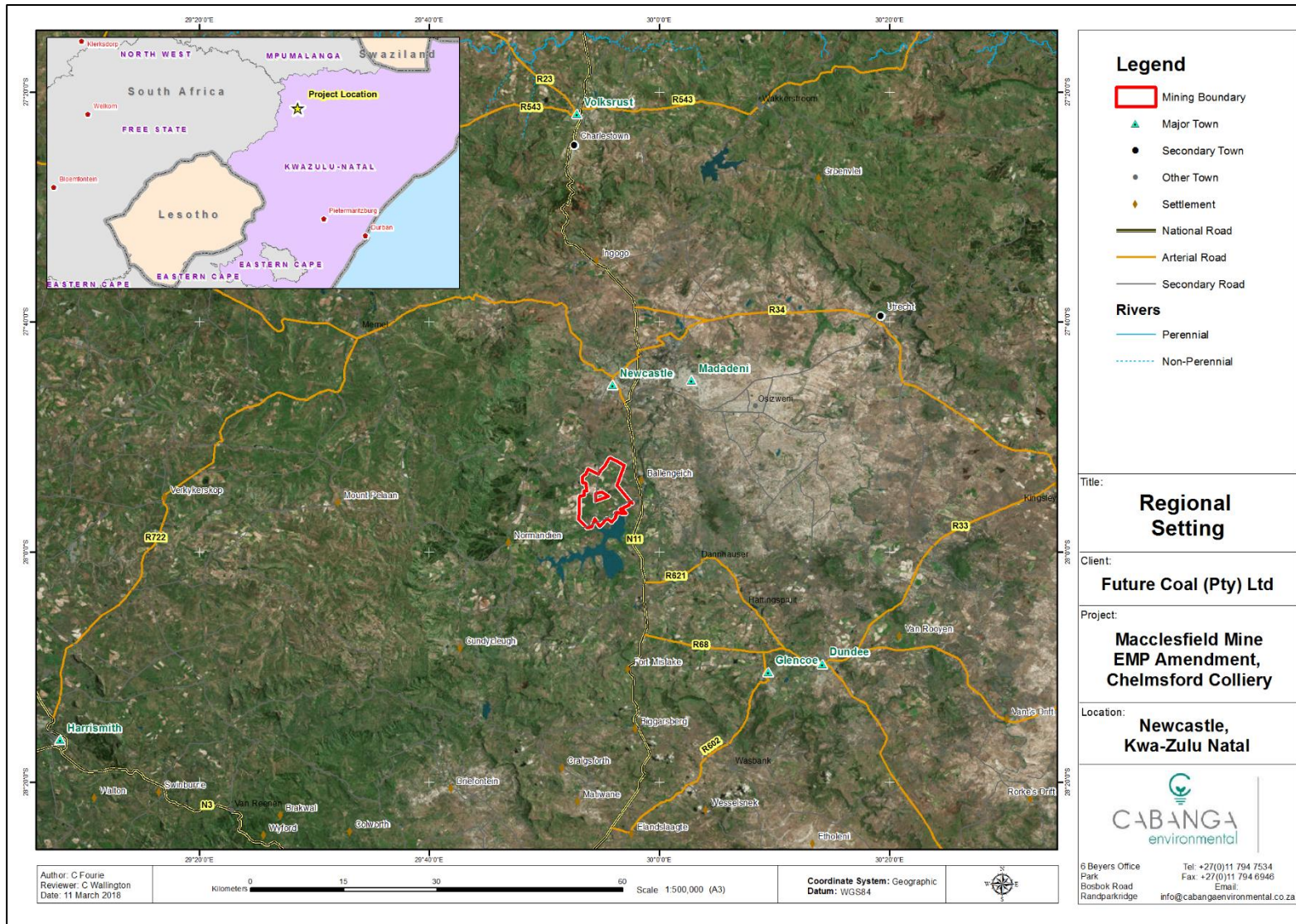


Figure 1: Regional Location of the Chelmsford Colliery

## 1.1 Structure of the Report

This Report has been prepared in accordance with the Financial Provisioning Regulations, 2015 (as amended) (FP Regulations) promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).

The Report addresses the requirements of the Annual Rehabilitation Plan, Final rehabilitation, decommissioning and mine closure plan, and the Environmental risk assessment report.

The Holder of a Mining Right is required to update the abovementioned on an annual basis. Therefore, this report will be updated annually hereafter.

Table 2 lists the specific requirements for each of the aforementioned plans as outlined in the FP Regulations and cross references them to the applicable section of this report.

**Table 2: Reporting requirements and structure of this Report**

No.	Requirement	Response
Required contents of an Annual Rehabilitation Plan (Appendix 3)		
a)	Details and expertise (including qualifications, professional registrations and experience) of the person who prepared the report, Timeframes for implementation of the current rehabilitation activities, and review of the previous rehabilitation activities	Section 1.2 and 2.3
b)	the pertinent environmental and project context relating directly to the planned annual rehabilitation and remediation activity;	Section 2
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;	Section 4.1.3
d)	an identification of shortcomings experienced in the preceding 12 months;	Section 6.1
e)	details of the planned activities for the coming 12 months (including activities that will address the aforementioned shortcomings); a motivation for the amount of annual rehabilitation that has taken place and is planned to take place. Pertinent closure objectives and performance targets that will be assessed in the following year; Closure design criteria and planned final land use details; Site plan showing current situation and planned rehabilitation	Table 14 and Section 5  Refer to Appendix A
f)	a review of the previous year's annual rehabilitation and remediation activities (also showing relationship between activities that were planned, and activities that have taken place)	Table 14
g)	Costing (including methodology, calculations, assumptions and monitoring and	Section 10

No.	Requirement	Response
	maintenance costs)	
Required contents of a Final Rehabilitation, Decommissioning and Mine Closure Plan (Appendix 4)		
a)	Details and expertise (including qualifications, professional registrations and experience) of the person who prepared the report,	Section 1.2
b)	Material information and issues (including stakeholder issues) that have guided the formulation of the plan; overview of the environmental and social context that may influence closure activities and post-mining land use; the mine plan and schedule for the full approved operations	Section 2
c)	Findings of an environmental risk assessment, leading to the most appropriate closure strategy	Section 4
d)	Design principles, including the legal framework, closure vision, objectives and targets, an evaluation of alternative closure and post-closure options, a motivation for the preferred options and a description of assumptions made with regards to closure actions.	Section 3, 5 and 8
e)	Description of the proposed final post-mining land use (including a Map)	Section 5.1
f)	Closure actions	Section 5.3
g)	Schedule of closure actions	Section 2.3
h)	Organisational capacity to implement the plan	Section 1.3
i)	Identification of gaps in the plan, and an action plan to address the gaps	Section 8
j)	Relinquishment criteria	Section 5.4
k)	Closure Cost estimation procedure (including methodology, calculations and cost assumptions)	Section 10
l)	Monitoring, auditing and reporting requirements relating to the risk assessment, legal requirements and knowledge gaps, including a Schedule of reporting requirements (internal and external) and Monitoring Plan	Section 9
m)	Motivation for amendments made to the plan, given the monitoring results in the previous auditing period and the gaps identified.	N/A
Required contents of an Environmental Risk Assessment Report (Appendix 5)		
a)	Details and expertise (including qualifications, professional registrations and experience) of the person who prepared the report,	Section 1.2

No.	Requirement	Response
b)	<p>Details of the assessment process used to identify and quantify latent risks including:</p> <ul style="list-style-type: none"> <li>• methodology;</li> <li>• reason(s) for the risks being latent (not mitigated prior to closure);</li> <li>• drivers that could result in the manifestation of the risk;</li> <li>• timeframe(s) which the risk is likely to manifest;</li> <li>• triggers that can be used to identify that the risk is imminent or has manifested;</li> <li>• results and findings of the risk assessment; and</li> <li>• explanation of changes to the risk assessment results from the previous year of assessment.</li> </ul>	Section 7
c)	Management activities, including monitoring, corrective or adaptive management and alternatives assessment.	Section 7
d)	Costing, including methodology, calculations, assumptions and monitoring costs post closure	Section 10
e)	Monitoring, auditing and reporting requirements	Section 9

## 1.2 Details of the Report Author

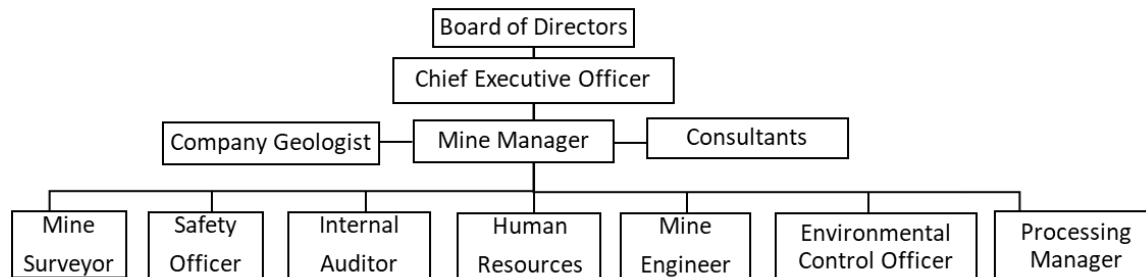
The details of the persons who prepared this report are provided in Table 3

**Table 3: Details of the Author**

<b>Report Author</b>	<b>Lelani Claassen</b>
Highest qualification	BSc Hons Environmental Management
Years' experience	10 years
<b>Author: Financial Provision</b>	<b>Ken van Rooyen Pr.Sci.Nat (Reg. 121/93)</b>
Highest qualification	MSc Geography
Years' experience	30
<b>Review</b>	<b>Jane Barrett</b>
Highest qualification	BSc Environmental Management & Botany
Years' experience	12

### 1.3 Organisational Structure and Capacity

The organisational structure of Chelmsford Colliery is indicated in the Figure 2.



**Figure 2: Future Coal and Chelmsford Colliery organisational structure**

#### 1.3.1 Organisation Capacity

The approved EMP (Van Hoven & Needham, May 2012) identifies various parties on the Mine who will be responsible for various aspects of Environmental Management throughout the Life of Mine.

The Holder of the Authorisation is ultimately responsible for ensuring the implementation of the EMP, throughout the Life of Mine, and for ensuring the closure plan is properly implemented. This responsibility is in large part delegated to the General Manager at the Mine, who in turn assigns responsibility for different specific activities to designated individuals including the Environmental Control Officer (ECO).

The General Manager and Environmental Manager must:

- ensure that the monitoring programmes are scoped and included in the annual mine budget;
- identify and appoint appropriately qualified specialists/engineers to undertake the programmes, where insufficient capacity exists in-house; and
- appoint specialists in a timeous manner to ensure work can be carried out to acceptable standards.

Contractors that conduct work on behalf of the Holder of the Mining Right are bound by the content of the EMP and a contractual condition to this effect will be included in all such contracts entered into by the mine (including contractors involved in the decommissioning, rehabilitation and closure process). If contractors are used, the responsibility for ensuring compliance with the EMP will remain with the Holder (Future Coal (Pty) Ltd).

The requirement for backfilling of excavations as part of the rollover mining method is included in the Mining Contractor's responsibilities.

The mine is obligated to provide sufficient organisation capacity to ensure effective implementation of the closure actions as stipulated in the EMP and this Report.

### 1.3.2 Current Financial Provision

Future Coal (Pty) Ltd currently holds a guarantee of R6,085,800.18 from Lombard Insurance Company Ltd for rehabilitation.

## 2 Project Contextualisation

Chelmsford Colliery is an existing, operational mine with an approved Mining Right (30/5/1/2/2/10006MR and 30/5/1/2/2/196 MR) and associated Environmental Management Plan (EMP) (Van Hoven & Needham, May 2012). The sections that follow provide detail on the Location and Nature of the existing and proposed mining activities and the environmental and legal context within which the Mine operates.

### 2.1 Project Location

Chelmsford Colliery is located in the Amajuba District Municipality and the Newcastle Local Municipality, in the Newcastle Magisterial District, KwaZulu-Natal Province (KZN). Coordinates for the approximate middle of the Mining Right Area (MRA) are 27°55'19.68"S; 29°54'25.83"E.

The MRA encompasses a total area of 5138.238ha. Table 4 shows the affected properties and the surface right ownership for all the properties affected by the MRA.

**Table 4: Surface Right Ownership**

Farm	Portions	Title deed	Surface area (ha)	Surface owner
Chelmsford 8642 HS	Portion 0	T63277/2005	459.2658	Grobler Gert Jacobus
Spectacle Spruit 9079 HS	Portion 1	T27975/1993	179.8540	Cronje Herman
Spectacle Spruit 9079 HS	Portion 2	T27976/1993	361.0507	Taggart Chad Warren
Hartebeest Bult 9197 HS	Portion 1	T3859/1972	152.1270	
Hartebeest Bult 9197 HS	Portion 0	T10286/2009	608.5030	Aveleda Pty Ltd
Exmoor 8095 HS	Portion 0	T37043/2009	745.7502	
Macclesfield 8418 HS	Portion 1	T36984/1995	648.5220	RSA
Macclesfield 8418 HS	Portion 0	T9220/1998		M L Phillips Trust-Trustees
Hérons Court 8521 HS	Portion 1	T9220/1998	333.0452	

Farm	Portions	Title deed	Surface area (ha)	Surface owner
Hérons Court 8521 HS	Portion 0	T26367/1980	333.0452	Van Vuuren Marieta Hertzogina
Forts 8502 HS	Portion 0	T26367/1980	623.1051	
Mooikrantz 9562 HS	Portion 0	T64160/2002	496.2204	Lekrantz Properties CC (Grant Collyer)
Mooikrantz 9652 HS	Portion 1	T64160/2002	99.3747	
Mooikrantz 9652 HS	Portion 2	T64160/2002	99.3747	

## 2.2 Activity Description

Chelmsford Colliery comprises two mining rights as follows:

- 30/5/1/2/2/10006MR,
  - The Farm Exmoor No 8095;
  - Remainder of the Farm Macclesfield No 8418;
  - Portion 1 of the Farm Herons Court No 8521;
  - the Remainder of Portion 1 and Portion 2 of the Farm Spectacle Spruit No 9079; and
  - the Remainder and Portions 1 and 2 of the Farm Mooi Krantz No 9562.
- 30/5/1/2/2/196 MR,
  - the Farm Forts No 8502;
  - the Remainder of the Farm Herons Court No 8521;
  - the Remainder of the Farm Chelmsford No 8642; and
  - the Remainder of the Farm Hartebeest Bult No 9197.

The operation is divided into five sections as described in Table 5.

The Mine Layout of the different Sections is shown in Figure 3.

Target monthly production for the whole Mine is estimated at around 100 000 tonnes per month for plant which will produce around 62 000-69 000 saleable tons. The overall planned Life of Mine (LoM) is approximately 25+ years with an additional 5 years post-closure monitoring.

The Chelmsford Mine incorporates both opencast and underground mining methods.



Opencast mining will be conducted through roll-over mining with successive cuts opened as old mined cuts are rehabilitated. Access to open pits will be via a low wall ramp. These access ramps will progress with the roll-over mining.

Where the coal seams are too deep and uneconomical for opencast mining, these will be mined through underground bord-and-pillar methods. Underground mine reserves will be accessed from the opencast highwalls, at the interface between opencast and underground mine areas. Mooikrantz Mine underground reserves will be accessed via a horizontal adit on site. Underground mining will be conducted by means of bord-and-pillar mining to a safety factor of 2+ as the mining progresses inward and on retreat the pillars will be extracted from all underground mine sections. An appropriate boundary pillar will be retained between the open cast and underground mining sections.

**Table 5: Description of the Mine Sections**

Section	Affected Farms	Mining Method	Description	Status
Ashley Section	Herons Court	o/c	<ul style="list-style-type: none"> <li>• Opencast and underground mining through highwall adits;</li> <li>• Overburden and topsoil stockpiles;</li> <li>• Security Access control;</li> <li>• Crushing, screening and stockpiling of coal at the plant area;</li> <li>• Wash Plant (under construction);</li> <li>• Central mining support infrastructure area, including workshops, stores and washbays;</li> <li>• Administrative area and central offices;</li> <li>• Pollution control dams (PCDs); and</li> <li>• Explosives Magazine (Lies between Ashley and Shelley).</li> </ul>	Currently Active at opencast section only.
	Herons Court	u/g		
	Macclesfield	o/c		
Shelley Section	Chelmsford & Forts	o/c	<ul style="list-style-type: none"> <li>• Opencast mining;</li> <li>• Overburden and topsoil stockpiles;</li> <li>• RoM stockpile area and crushing and screening; and</li> <li>• Container offices/workshops.</li> </ul>	Currently Active (opencast)
Macclesfield Section	Macclesfield & Herons Court	o/c	<ul style="list-style-type: none"> <li>• Proposed Opencast mine areas (x3);</li> <li>• Proposed topsoil and overburden stockpiles (location will change as mining progresses and material is backfilled into mined-out voids);</li> <li>• Proposed temporary small in-pit ROM coal stockpile area (location will change as mining progresses, continuously removed to Ashley Plant); and</li> <li>• Container to serve as workshop/ office.</li> </ul>	Currently no activities.

Section	Affected Farms	Mining Method	Description	Status
Mooikrantz Section	Mooikrantz	u/g	<ul style="list-style-type: none"> <li>• Underground mining areas;</li> <li>• Accessed by horizontal adit;</li> <li>• Temporary small ROM coal stockpile area; and</li> <li>• Container to serve as workshop.</li> </ul>	No activities have commenced yet
Exmoor Section	Exmoor, Hartebeestbult and Spectacle Spruit	u/g	<ul style="list-style-type: none"> <li>• Underground mining which will be accessed through Ashley Mine and Shelley Mine (no other infrastructure).</li> </ul>	No activities have commenced yet

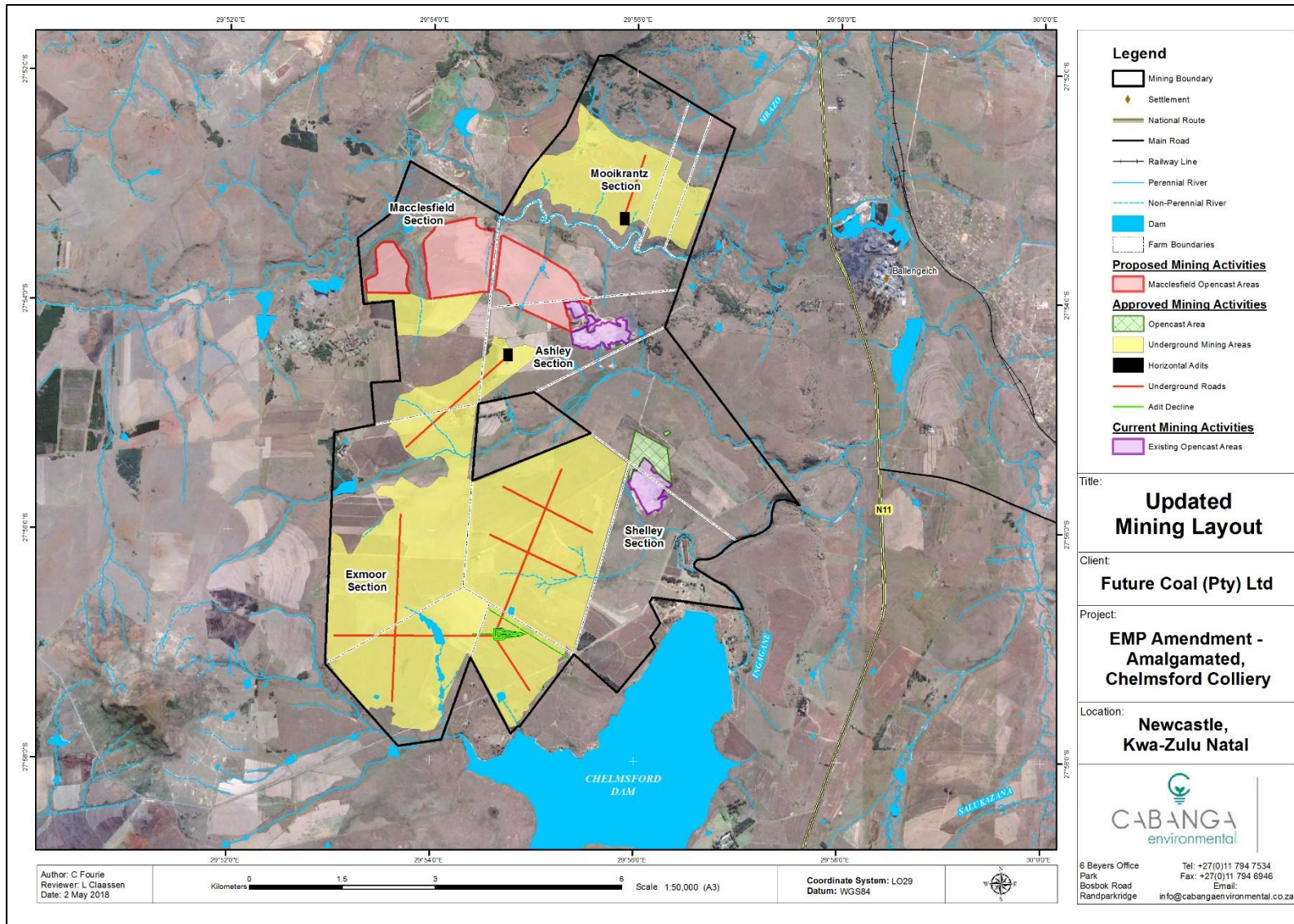


Figure 3: Layout of Chelmsford Colliery

### 2.3 Life of Mine Description and Closure Schedule

Historical mining in the Klip River Coal Field started as early as 1865 near Dundee. By 1985 before the decline of operating collieries in KwaZulu Natal there were 13 producing Collieries in the coal field. Known mining operations in the immediate vicinity of the Chelmsford Colliery included coal mining on the farms Mooikrantz, Chelmsford, Exmoor, Heronscourt and Macclesfield.

Chelmsford Colliery has an approved EMP for the operations (Chelmsford Colliery II Environmental Impact Assessment and Environmental Management Plan, May 2012. Prof. Dr. Wouter van Hoven and R.Needham.).

The two mining rights (30/5/1/2/2/10006MR and 30/5/1/2/2/196 MR) are operated under the 2012 approved EMP. Future Coal have applied for amendment of the 2012 EMP, to reflect the Macclesfield Section as an opencast operation. The Mine Sections to which each right applies is shown in Table 6 along with the expiry date of each of the Mining Rights. Future Coal must ensure that they apply for renewal of the rights timeously.

The Shelley and Ashley opencast sections are currently active. The overall planned life of mine (LoM) is approximately 25+ years, with an additional 3-5 years post-closure monitoring.

Figure 4 presents a conceptual Life-of Mine Schedule.

**Table 6: Validity and relevance of Mining Rights**

Mining Right	Validity	Farm Portions	Mine Section
30/5/1/2/2/196MR	2020	Forts No 8502 Remainder of the Farm Herons Court No 8521 Remainder of the Farm Chelmsford No 8642 Remainder of the Farm Hartebeest Bult No 9197	Ashley Section Shelley Section Macclesfield Section pit C Portion of Exmoor Section
30/5/1/2/2/10006MR	2038	Exmoor No 8095 Remainder of the Farm Macclesfield No 8418 Portion 1 of the Farm Herons Court No 8521 the Remainder of Portion 1 and Portion 2 of the Farm Spectacle Spruit No 9079 Remainder and Portions 1 and 2 of the Farm Mooi Krantz No 9562	Exmoor Section Macclesfield Section Mooikrantz Section

Mine Section	Status	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Ashley	Full Production	Red	Red																								
	Production decline			Yellow																							
	Decommissioning				Purple																						
	Post-Closure Monitoring					Blue	Blue	Blue	Blue	Blue	Blue												Blue	Blue	Blue	Blue	Blue
Ashley Plant	Construction	Yellow																									
	Operation		Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
	Decommissioning																										
	Post-Closure Monitoring																							Blue	Blue	Blue	Blue
Shelley	Full Production	Red																									
	Production decline		Yellow																								
	Decommissioning				Purple																						
	Post-Closure Monitoring					Blue	Blue	Blue	Blue	Blue													Blue	Blue	Blue	Blue	Blue
Macclesfield	Site Establishment		Yellow																								
	Production ramp-up			Yellow																							
	Full Production				Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
	Production decline													Yellow													
	Decommissioning														Purple												
Post-Closure Monitoring															Blue	Blue	Blue	Blue	Blue	Blue			Blue	Blue	Blue	Blue	
Mooikrantz	Site Establishment					Yellow																					
	Production ramp-up						Yellow																				
	Full Production							Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
	Production decline														Yellow												
	Decommissioning															Purple											
Post-Closure Monitoring																Blue	Blue	Blue	Blue	Blue			Blue	Blue	Blue	Blue	
Exmoor	Site Establishment									Yellow																	
	Production ramp-up										Yellow	Yellow															
	Full Production												Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
	Production decline																					Yellow					
	Decommissioning																						Purple				
Post-Closure Monitoring																							Blue	Blue	Blue	Blue	

Figure 4: Conceptual Life of Mine Schedule

## 2.4 Summary of the Environmental and Social Context of the Project

The pertinent environmental and social conditions at the Site are summarised in Table 7.

**Table 7: Environmental and Social Context**

Aspect	Description	
Climate	Warm, temperate, summer rainfall 687mm/year. Thunderstorms, drought, mist and frost frequent. Wind speeds below 35km/h.	
Topography	Varying topography including hills, ridges, koppies and kloofs. The northern section of the mining right area is situated on a hillslope. The topography incises along the Horn River, Nqusha Spruit, Spectacle Spruit and Ngagane River.	
Surface Water	Buffalo Catchment of the Pongola-Mtamvuna (previously the Thukela) Water Management Area (WMA).	
	<b>Mine Section</b>	<b>Catchment</b>
	Ashley Section	The main infrastructure area occurs within V31G with mining areas occurring in V31G and V31F
	Shelley Section	The section falls entirely within V31G
	Macclesfield Section	The main mine area occurs in V31F with the southern part of the property in V31G
	Mooikrantz Section	This Section occurs in the V31F and V31K catchments, with the infrastructure area in V31F.
	Exmoor Section	Falls within V31G and V31E catchments
	Important surface water features: Mbazoo River; Horn River; Ngagane River; Nqusha Spruit; Spectacle Spruit; Ntshingwayo (Chelmsford) Dam	
	Current water quality monitoring shows pH, Electrical Conductivity and Total Dissolved Solids within the SANS 241 (2011) Drinking Water standards, through non-compliant with some of the parameters stipulated in the IWUL.	
	Water uses in the WMA are largely for irrigation followed by urban, mining/industrial and rural requirements. At the site surface water resources are very important for livestock watering.	
The wetlands within the mineral boundary have been ranked as Freshwater Ecosystem Priority Areas (FEPA) 2, 5 and 6 wetlands		
Groundwater	Two aquifers occur in the area: a) the upper weathered material, and b) the underlying competent and fractured rock material.	
	The depth to groundwater level in general ranges between artesian and 66 m below surface. The average groundwater level for the Mining Right Area is 6.5 mbgl.	

Aspect	Description
	<p>The transmissivity in the Newcastle area has been found to vary in the range 10 to 30m<sup>2</sup>/day seldom exceeding 50m<sup>2</sup>/day. More realistically overall it is in the order of 3 to 5m<sup>2</sup>/day. Storativity in the mining area with relation to the aquifers is approximately 0.17%.</p> <p>The general regional aquifer is classified a minor aquifer, but of high importance to the local landowners.</p> <p>Baseline Groundwater monitoring revealed that there was no contamination present and that groundwater was in a healthy state (2007). 2015 Monitoring data were also compared to SANS 241 (2011) drinking water standards; no measured parameter exceeded SANS 241 guidelines. On the whole the groundwater showed a bicarbonate chemical makeup.</p> <p>Current monitoring results show water from the Pit, the PCD and seepage areas as being acidic, as would be expected in the Mine's Dirty Water containment facilities. Electrical conductivity and Total Dissolved Solids values in the pit exceed allowable limits, as may be expected.</p>
Geology and Soils	<p>Klip River Newcastle Coalfield. The coal bearing Vryheid Formation ranges in thickness from 80 m to 300 m in this Coalfield. The Vryheid Formation consists mainly of shale, sandstone and coal beds.</p> <p>The two seams present in the area of the project are the Alfred and the Gus seams.</p> <p>The Alfred or Top seam is between 25 cm and 1.5 m thick and averages about 0.5 m and consists of high quality bright to dull coal with thin intercalated shale bands</p> <p>The Gus or Bottom seam is the main target seam in the Chelmsford Colliery. The Gus seam varies from 50 cm thick to over 2 m in places and averages more than 1m. It consists mostly of bright coal. The Gus seam has a shale layer splitting the seam into a "second" and "third" coal seam.</p> <p>Bb53 land type: The dominant soils on the crests in this land type are expected to be shallow rocky Mispah and Glenrosa soils with Hutton and Clovelly soils where the slope is less steep. The midslope positions will be dominated by a combination of Hutton, Clovelly, Avalon and Longland soil forms. The soils that dominated the footslopes and the valley bottoms are the Katspruit, Longland, Oakleaf and Dundee soil forms.</p>
Biodiversity	<p>Grassland biome. Northern KwaZulu-Natal Moist Grassland (Gs4) (majority) with small patches Eastern Temperate Freshwater Wetlands vegetation (Mucina &amp; Rutherford, 2006). Numerous Flora and Fauna Species of Conservation Concern (SCC) recorded on site and surroundings (including avifauna, herpetofauna and mammals that are protected species).</p>
Land Use	<p>Immediately surrounding land uses predominantly comprise agricultural activities in the form of cultivation and grazing land. Past mining activities are also in evidence.</p>



Aspect	Description
Road network and Traffic	The N11 is located to the east of the MRA, the P210 towards the south and the P209 traverses the site (north-south orientation). Roads are generally in a good condition with the exception of the P210 between the P209 and the N11.
Socio-Economic	<p>Total population: Newcastle Local Municipality = 363 237 people. Between 1996 and 2001, population increased by 2.93% per annum. Gender distribution shows 47.6% male and 52.4% female. 91.9% of the population are Black African, 3.9% White, 3.2% Indian and 1% Coloured.</p> <p>The majority of the population of the Newcastle LM is of working age and the majority of the population over the age of 20 has completed a matric education.</p> <p>37,4% of the 100 654 economically active individuals (i.e. those who are employed or unemployed but looking for work) are unemployed. Of the 53 886 economically active youth (15–34 years) in the municipality, 49,0% are unemployed.</p> <p>The most notable agricultural activities are cattle (beef farming), dairy, maize and soybean farming.</p> <p>Primary economic activity and the greatest contributor to the employment within the area are agriculture as well as the coal processing industry.</p>
Heritage and Archaeology	There are graves located on the Macclesfield Farm within the Mining Rights Area (MRA). These will be excluded from the mining footprint and appropriate buffers implemented.

## 2.5 Stakeholder Concerns

Future Coal are in the process of applying for amendment of their EMP and for Environmental Authorisation to be able to mine the Macclesfield Reserves via opencast methods. As part of the amendment application process, a public participation process (PPP) has been initiated.

Therefore, this report along with the Draft Amended EMP and a Draft Basic Assessment Report (BAR) (Claassen, 2018) will be made available for a public review period of 30 days. Comments received on the aforementioned reports will be addressed in updated reports after conclusion of the PPP.

The public consultations undertaken to date identified the following primary concerns of stakeholders:

- Surface and Groundwater quality and availability;
- Relocation of affected parties within and in proximity to the blasting zones;
- The impacts of blasting on surrounding infrastructure and houses;
- Traffic impacts and deteriorating road conditions;
- Rehabilitation and the resultant productivity of land; and
- Impacts of the mine on biodiversity including wetland ecology and species of conservation concern (flora and fauna).

### 3 Legal Framework for Closure

On 2 September 2014, the One Environmental System came into effect making the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) the overarching National environmental legislation. In terms of Section 12(4) of the NEMA Amendment Act, 2008 (Act No. 62 of 2008) an Environmental Management Programme (EMPr) approved in terms of the MPRDA, prior to the One Environmental System coming into effect, is regarded as having been approved in terms of NEMA.

The NEMA (as amended) states in Section 24P that the holder of an environmental authorisation pertaining to mining must comply with the prescribed financial provision for the rehabilitation, closure and on-going post decommissioning management of negative environmental impacts arising from the mining operation. Section 24(P)(3) prescribes that every holder must annually assess their environmental liability and ensure that the financial provision is to the satisfaction of the Minister of Mineral Resources.

The financial provision contemplated in Section 24P must guarantee the availability of sufficient funds to:

- Rehabilitate adverse environmental impacts of the activities<sup>1</sup>;
- Undertake decommissioning and closure of the operations, including removal of buildings, structures and other related facilities and objects;
- Remediate latent or residual environmental impacts resulting from the operations, which may only become known or apparent in future; and
- Remediate any other negative environmental impacts.

The Financial Provision Regulations, 2015 (as amended), regulates the determination and provision as contemplated in NEMA for the costs associated with the management, rehabilitation and remediation of environmental impacts resulting from mining operations. The Regulations apply to applicants and holders of mining rights and permits.

This report was compiled in terms of the Financial Provision Regulations, 2015 (as amended), on behalf of Future Coal.

There are a number of other laws and regulations which are relevant to the operations and eventual closure and rehabilitation of Chelmsford. The most pertinent legal requirements that are relevant to the closure and rehabilitation, in addition to the Financial Provision Regulations, are summarised below.

#### 3.1 Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) (as amended)

The Constitution is the supreme law of the country and sets the framework within which all other laws are implemented. Section 24 of the Constitution states that:

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<sup>1</sup> "Activities" in this context refers to Activities Listed in terms of the NEMA Regulations, as well as prospecting, exploration, mining or production activities, including the pumping and treatment of polluted or extraneous water.

*Everyone has the right to (a) an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -*

- a) Prevent pollution and ecological degradation;*
- b) Promote conservation; and*
- c) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*

To give effect to Section 24 of the Constitution, several laws have been promulgated to ensure environmental protection and sustainable development.

Closure and Rehabilitation at Chelmsford Colliery after the LoM has been reached must be undertaken with due cognisance of the constitutional obligations of the Holder of the Mining Right (Future Coal Pty Ltd), not to threaten the rights of other people to an environment that is safe and healthy.

### **3.2 Minerals and Petroleum Resources Development Act, 2002 (MPRDA) (Act No. 28 of 2002) and its Regulations**

The MPRDA is the predominant piece of legislation dealing with the acquisition and execution of rights to search for, extract and process mineral resources in South Africa. Future Coal (Pty) Ltd holds two Mining Rights at the Chelmsford Colliery under a single approved EMP.

Decommissioning, closure and rehabilitation of Mines were in the past regulated in terms of the MPRDA, though these matters are currently dealt with in terms of the NEMA. Still, when applying for a mining right or amendment thereof, the MPRDA requires an assessment of the closure and rehabilitation of the Mine and a calculation of the financial provision that will be required for closure.

Section 43 of the MPRDA deals specifically with closure certificates and states that the Holder of a Mining Right will remain responsible for environmental liabilities, pollution and ecological degradation and the management thereof, until the Minister of Mineral Resources has issued a closure certificate for the operation. The Holder (Future Coal Pty Ltd) must apply for a closure certificate upon the lapsing of the validity of the Mining Rights (or abandonment or cancellation); cessation of the mining operation (or part thereof) or relinquishment of any portion of the land to which the Mining Right relates.

The Mineral and Petroleum Resources Development Amendment Act, 2008 (Act No. 49 of 2008) (MPRDAA) amended certain sections of the MPRDA to make the Minister of Mineral Resources the responsible authority for implementing environmental matters in terms of the NEMA as it relates to mining and prospecting operations and incidental activities, and to align the MPRDA with NEMA.

### **3.3 National Environmental Management Act, 1998 (Act No. 107 of 1998) and EIA Regulations, 2014 (as amended)**

The NEMA provides for environmental governance and all matters affecting the environment, including mining operations. NEMA places an obligation on all persons to take

reasonable measures to prevent pollution and environmental degradation, and to minimise and rectify pollution and environmental degradation that could not be prevented. It is in this context that Mines are required to plan and make financial provision for closure and rehabilitation.

The EIA Regulations includes lists of activities that may not be undertaken without Environmental Authorisation in terms of NEMA having been granted. Decommissioning of facilities, and activities that require licenses or permits in terms of the MPRDA are included in the Listed Activities. Mine decommissioning and closure will therefore be subject to an application for Environmental Authorisation and be associated with the compilation of a detailed closure plan, the required contents of which is set out in the EIA Regulations. The EIA Regulations also refer to the Financial Provisioning Regulations where an activity relates to mining.

### **3.4 National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEM:BA) and associated Regulations**

The NEMBA provides for the management and conservation of South Africa's biodiversity within the framework of the NEMA and deals specifically (among other matters) with the management of Alien and Invasive Species. Alien and invasive species management at Chelmsford Colliery is the Mine's responsibility and must be implemented in terms of concurrent and eventual final rehabilitation of affected and surrounding areas.

### **3.5 National Environmental Management: Air Quality Act (NEM:AQA), Act 39 of 2004 as amended and associated regulations**

Decommissioning, closure and rehabilitation activities are also often associated with the generation of dust and emissions. Dust, PM10 and PM2.5 monitoring at Chelmsford must continue throughout the decommissioning, closure and rehabilitation phases to ensure the Mine's compliance to the National Dust control regulations and emission standards

### **3.6 National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA) and its Regulations**

NEM:WA addresses waste generation, classification and management issues, including recycling of waste. Part 8 of the NEM:WA deals specifically with contaminated land, and remediation thereof. Apart from requisite compliance to the NEM:WA and its regulations in terms of the management of mineral- and non-mineral waste throughout the LoM (including closure), relinquishment criteria must include the specific determination of the status of the land, in terms of Part 8. If the land had been contaminated by the Mining or related activities, remediation in terms of Part 8 must be successfully undertaken by Chelmsford Colliery, prior to a closure certificate being granted.

### **3.7 National Water Act, 1998 (Act No. 36 of 1998) (NWA) and associated regulations**

The NWA is the principal Act regulating water use in South Africa, and places an obligation on the owner, occupier or person in control of land to mitigate against potential pollution of water resources, including the remediation of polluted water after closure.

The Regulations on use of water for mining and related activities aimed at the protection of water resources promulgated in terms of the NWA (GN704) contains specific regulations for rehabilitation of coal residue deposits, which state that any person who establishes a coal residue deposit must rehabilitate the residue deposit to ensure compaction thereof (to prevent spontaneous combustion and minimise the infiltration of water) and to ensure that rehabilitation is implemented concurrently with the mining operation.

Regulation 2(2) requires that the Holder notify DWS in writing prior to the temporary or permanent cessation of mining and related activities. Regulation 9 stipulates that the requirements of GN704 still applies to operations that have permanently or temporarily ceased.

## **4 Environmental Risk Assessment to identify the closure strategy**

This section contains the findings of an environmental risk assessment leading to the most appropriate closure strategy, and includes:

- (i) a description of the risk assessment methodology;
- (ii) an assessment of risks associated with the decommissioning and closure activities at Chelmsford Colliery, and measures to manage the identified risks;
- (iii) an assessment of residual risk significance after the implementation of management measures; and
- (iv) an identification of indicators that are most sensitive to potential risks and the monitoring of such risks / indicators.

### **4.1.1 Risk Assessment Methodology**

The Risk Assessment is undertaken on desktop level with reference to the impacts identified in the various assessment and application processes that have been undertaken for the Chelmsford Colliery. Risks are identified in one or more of the following Risk Categories:

- Environmental Risk;
- Health and Safety Risk;
- Legal / regulatory risk;
- Company Risk (loss of social license to operate etc.)

The identified risks are rated according to the criteria presented in Table 8, to determine the significance of each:

**Table 8: Risk Criteria**

CONSEQUENCE					
	Minor	Moderate	High	Major	
	1	2	3	4	
Environmental	Short-term, isolated extent, no loss of resource, aspect not sensitive	Medium-term over entire project area. Altered functioning of ecosystems processes	Long-term, off-site effects, reduced ecosystem function	Permanent, off-site impacts, ecosystem function destroyed / completely altered	
Health & Safety	First aid / Medical treatment, no lost time	Medical treatment, Reversible health impact with lost time	Permanent disability or single fatality	Multiple disabilities or fatalities	
Legal	Non-compliance, correction and reporting required	Non-compliance, correction, reporting and fines	Breach of law: criminal prosecution possible	Breach of law: License revoked	
Company	Isolated complaints	Isolated protest / negative media coverage	Significant protests / industrial action	Permanent Loss of social license to operate	
PROBABILITY					
Highly likely	4	The unwanted event is very likely to occur			
Probable	3	The unwanted event will probably occur at some point			
Possible	2	The unwanted event might occur / has occurred in the past or at similar facilities			
Unlikely	1	The unwanted event might occur, but it is not likely			
SIGNIFICANCE					
Probability	Consequence				
		1	2	3	4
	4	4	8	12	16
	3	3	6	9	12
	2	2	4	6	8
1	1	2	3	4	
Major Risk					
High Risk					
Moderate Risk					
Minor Risk					

**4.1.2 Risk Identification and assessment**

The most significant risks associated with the decommissioning and closure of the Chelmsford Colliery were identified by undertaking a review of the approved EMP, the revised Draft EMP and BAR (Claassen, 2018) and in discussion with the Holder of the Mining Right. Additionally, risks identified by stakeholders during the PPP undertaken to date were also considered. The following primary risks were identified:

- **Loss of land capability:** The risk can manifest from various sources including deterioration of surface or groundwater quality (due to pollution or siltation), loss of agricultural soils, and/or surface subsidence;
- **Loss of biodiversity:** The Mine is located in an ecologically sensitive area. If rehabilitation is not implemented concurrently or if rehabilitation success is compromised, the risk can manifest due to:

- continued displacement and fragmentation of the faunal community (including threatened species) due to ongoing anthropogenic disturbances and habitat degradation;
  - Continued encroachment and displacement of indigenous vegetation community by alien invasive plant species;
  - Incorrect waste storage and/or disposal leading to problem animals attracted to site and/or potential contamination through littering; and
  - Potential loss of flow to local wetland systems and catchment;
- **Social** impacts / risks: Loss of long-term job opportunities after closure; and
  - Deterioration of **surface and/or groundwater quality** due to poor quality seepage from the mining area and potential Acid Mine Drainage (AMD).

These risks were assessed according to the criteria presented in Table 8. The results of the Risk Assessment are shown in Table 9

**Table 9: Risk Assessment: Decommissioning and Closure Phase**

Risk	Source / Activity presenting the Risk	P	C	Significance (Unmanaged)	Management	P2	C2	Significance (Managed)
Loss of land capability	Deterioration of surface or groundwater quality (due to pollution or siltation)	3	3	High	<b>Prevent</b> contamination of water resources by implementing GN704 compliant stormwater management plan throughout all project phases	1	3	Moderate
Loss of land capability	Loss of agricultural soils due to soil stripping	3	3	High	<b>Prevent</b> loss of soils by following the soil utilisation guide. <b>Manage</b> the impact by implementing concurrent rehabilitation and soils monitoring, with amelioration based on specialist recommendations	2	2	Moderate
Loss of land capability; Injury to persons; damage to property	Subsidence	2	3	High	<b>Prevent</b> subsidence by implementing safety measures when mining underground. <b>Monitor</b> the surface for subsidence and <b>remedy</b> subsidence by backfilling to ensure surface is returned to free-draining landform	2	2	Moderate
Loss of biodiversity; deteriorating air quality (dust) and associated Health Risks	Insufficient rehabilitation	3	3	High	<b>Prevent</b> the loss of biodiversity by ensuring rehabilitation is done concurrently. <b>Monitor</b> the success of rehabilitation (backfilling and vegetating) and implement follow-up measures where necessary. Continue to <b>Monitor</b> Dust Fallout, until all dust sources have been appropriately rehabilitated.	1	2	Minor
Loss of biodiversity	Continued displacement and fragmentation of the faunal community (including threatened species) due to ongoing anthropogenic disturbances and habitat degradation	2	3	High	<b>Prevent</b> disturbances to faunal communities: rehabilitate affected areas to provide suitable habitat for fauna SCC. Implement environmental awareness programs to prevent poaching and human interaction with fauna	1	3	Moderate



Risk	Source / Activity presenting the Risk	P	C	Significance (Unmanaged)	Management	P2	C2	Significance (Managed)
Loss of biodiversity	Continued encroachment and displacement of indigenous vegetation community by alien invasive plant species	3	3	High	<b>Manage</b> through the implementation of the Alien Invasive Management and eradication plan. Commence with Alien Invasive eradication during the operational phases and ensure follow-up management is undertaken as well. Rehabilitate affected areas to enable the establishment of viable indigenous plant communities	1	2	Minor
Loss of biodiversity; Health Impacts; Visual and odour	Incorrect waste storage and/or disposal leading to problem animals attracted to site and/or potential contamination through littering	3	2	High	<b>Prevent</b> contamination occurring by ensuring waste storage and disposal is in line with best practice measures and minimum norms and standards. All hazardous waste to be disposed of at licensed facilities and disposal records kept by the Mine. Implement environmental awareness training to ensure staff understand their responsibilities in terms of waste generation, management and disposal.	1	2	Minor
Loss of biodiversity	Potential loss of flow to local wetland systems and catchment	3	3	High	<b>Remedy</b> by ensuring effective rehabilitation in all affected areas, to restore wetland catchments to uncontaminated, free-draining landscapes	1	2	Minor
Social impacts / risks	Loss of long-term job opportunities after closure	4	2	High	<b>Manage</b> by ensuring effective communication with employees prior to decommissioning, to manage employee expectations. Assist with finding alternative employment where feasible.	4	1	Moderate

Risk	Source / Activity presenting the Risk	P	C	Significance (Unmanaged)	Management	P2	C2	Significance (Managed)
Deterioration of surface and/or groundwater quality	Poor quality seepage from the mining area and potential Acid Mine Drainage (AMD)	3	3	High	<p><b>Prevent:</b> Carbonaceous material must be placed and compacted at the bottom of the pit during backfilling. The pit must be kept as dry as possible through dewatering. This will reduce the risk of AMD conditions as exposure of pyritic material to water is reduced. Roll-over mining must be concurrent to rehabilitation as this will again assist in reducing exposure of pyritic material with the elements which leads to AMD formation.</p> <p><b>Manage:</b> AMD decant is expected to occur potentially at Ashley, Macclesfield and Shelley sections. Management of latent impacts is further discussed in Section 7.</p>	2	3	High

### 4.1.3 Identification of risk indicators and risk monitoring

Table 10 identifies indicators and monitoring requirements for each of the risks identified in Section 4.1.2, to ensure early identification of the manifestation of risks, and to inform the rehabilitation and remediation activities that are required to manage each risk (in addition to the Management measures detailed in Table 9).

**Table 10: Environmental Indicators and Monitoring**

<b>Risk</b>	<b>Source / Activity presenting the Risk</b>	<b>Risk indicator that requires monitoring, and monitoring criteria</b>
Loss of land capability	Deterioration of surface or groundwater quality (due to pollution or siltation)	Surface and groundwater monitoring as per section 9
	Loss of agricultural soils	Soil monitoring and amelioration as per section 9
	Subsidence	Visual inspection of affected surface areas for signs of subsidence or erosion
Loss of biodiversity	Insufficient rehabilitation	Annual EMP audits and annual updates of this report
	Continued displacement and fragmentation of the faunal community (including threatened species) due to ongoing anthropogenic disturbances and habitat degradation	Review of environmental awareness training material and implementation of training schedule. Rehabilitation monitoring by ECO
	Continued encroachment and displacement of indigenous vegetation community by alien invasive plant species	Alien invasive management plan and annual monitoring as part of EMP and IWUL audits
	Incorrect waste storage and/or disposal leading to problem animals attracted to site and/or potential contamination through littering	Annual EMP audit and internal ECO audits to ensure proper waste management.
	Potential loss of flow to local wetland systems and catchment	Rehabilitation monitoring and annual wetland monitoring.
Social impacts / risks	Loss of long-term job opportunities after closure	SLP and HR Department to manage communications
Deterioration of surface and/or groundwater quality	Poor quality seepage from the mining area and potential Acid Mine Drainage (AMD)	Groundwater monitoring as per section 9. Management options are further discussed in Section 7.

The management measures identified in Table 9 are aimed at the avoidance, management or mitigation (as appropriate) of the identified impacts and risks associated with closure of the Chelmsford Colliery.

The identified impacts and risks are based on the approved EIA/EMP (Van Hoven & Needham, May 2012), the Draft Amended EMP, IWWMP (Kasl, 14 December 2016), the Draft updated EMP and Basic Assessment (Claassen, 2018) and associated specialist studies. In the aforementioned documents, the potential impacts of the Mine were rated first without the consideration of mitigation or management measures, and again after the implementation of such measures.

The risk assessment presented in this section is not a duplication of the Impact Assessment undertaken during the compilation of the EMP or IWWMP, but rather an update and summary of the previous impact assessments to highlight those risks most closely associated with the decommissioning, closure and post-closure phases of Chelmsford Colliery.

## 5 Closure Objectives and Vision

The approved Environmental Management Plan (EMP) (Van Hoven & Needham, May 2012) identifies overall and area-specific closure objectives. These are summarised in Table 11.

In summary, the general closure objectives are to:

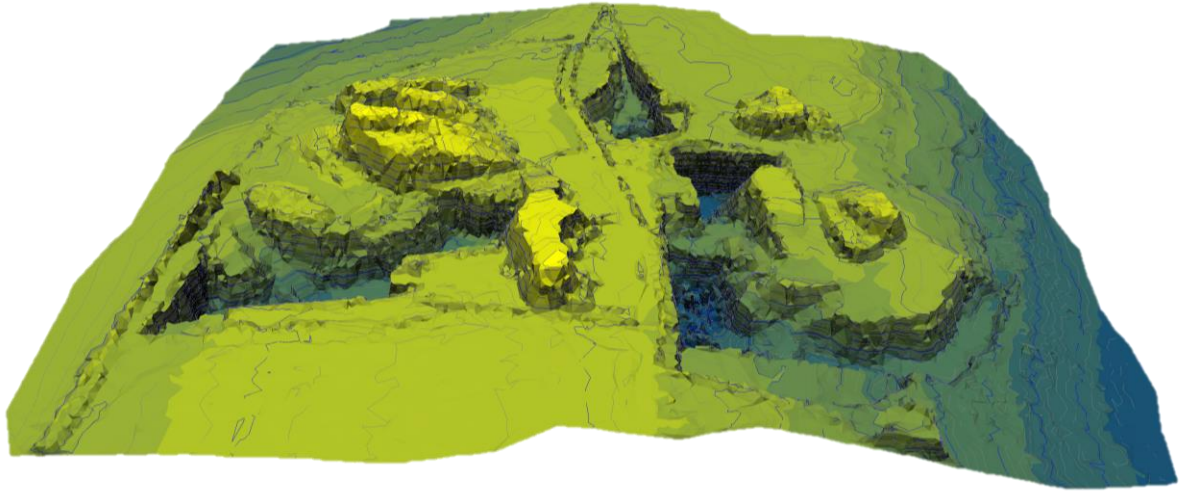
- Return land, wherever feasible and practical, to a land capability similar to that which existed prior to mining and that the management level required to utilise the rehabilitated land is within the means of the farmer who uses it.
- Ensure that the facilities are appropriately rehabilitated so that it does not cause surface water, groundwater or air pollution and that it is structurally stable.
- Demolish all mine infrastructure that cannot be used by a subsequent land owner or a third party. The areas that are demolished will be rehabilitated to at least a grazing land capability.
- Clean up all material stockpiles and loading areas and rehabilitate these to at least a grazing capability.

### 5.1 Final Land Use

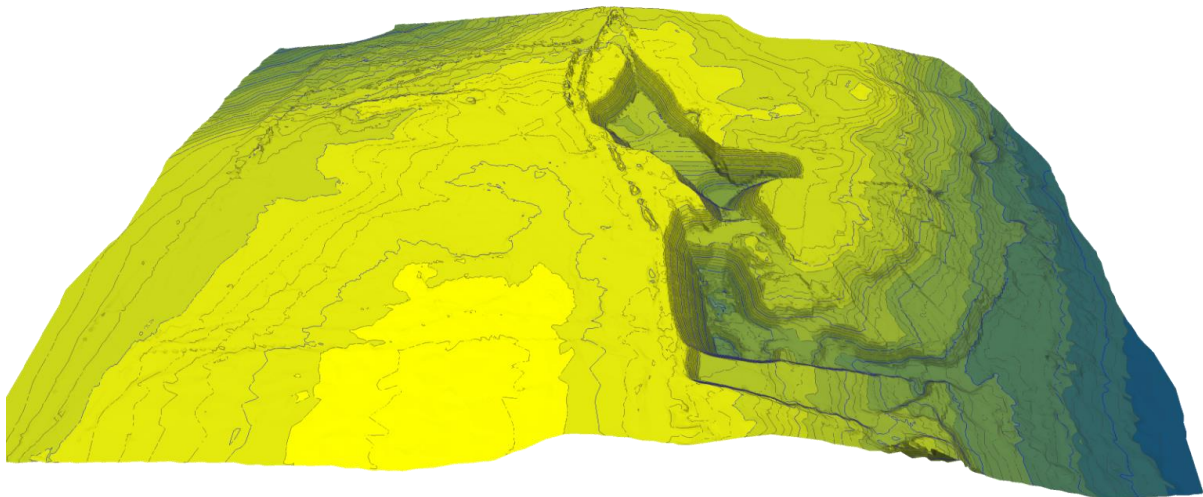
After the LoM for each mine section is reached, the areas will be rehabilitated to a pre-determined land use. The Ashley plant and supporting infrastructure will remain on site until the end of LoM. The following post-closure land uses are envisaged:

1. Ashley Section – Grazing and Wilderness;
2. Shelley Section – Grazing and Wilderness;
3. Macclesfield Section – Arable, Grazing and Wilderness;
4. Mooikrantz Section – Arable, Grazing and Wilderness; and
5. Exmoor and Spectacle Spruit Sections – Arable, Grazing and Wilderness.

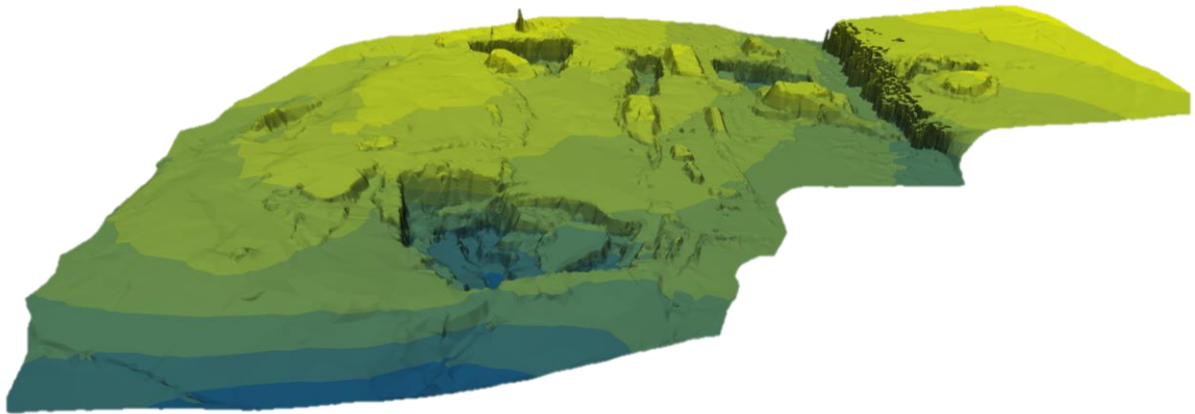
Post-Closure landforms before and after rehabilitation of the Ashley and Shelley Sections have been modelled, as shown in Figure 5 Figure 6 to Figure 8.



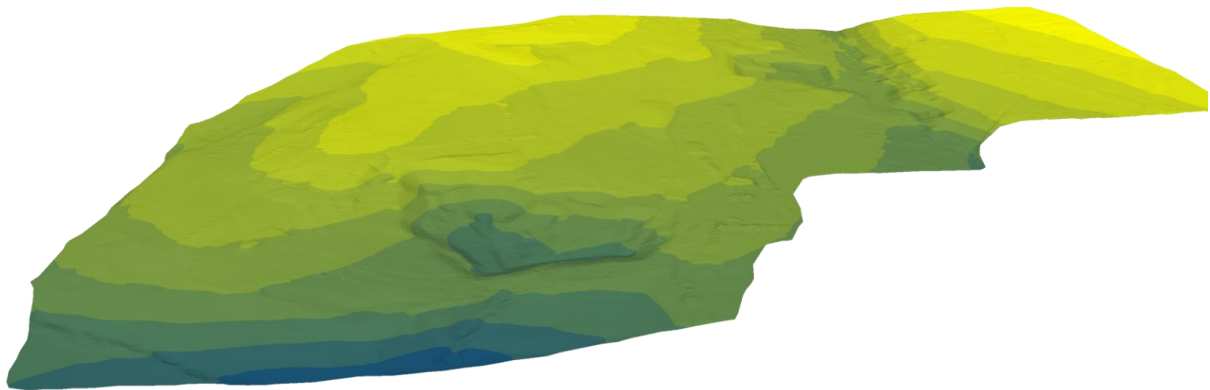
**Figure 5: Ashley Section, before rehabilitation in the event of immediate closure**



**Figure 6: Ashley Section, after rehabilitation in the event of immediate closure**



**Figure 7: Shelley Section, before rehabilitation in the event of immediate closure**



**Figure 8: Shelley Section, after rehabilitation in the event of immediate closure**

**Table 11: Closure Actions and Objectives**

Mine Area	Closure Actions	Closure Objective
General objectives	<ul style="list-style-type: none"> <li>Return land, wherever feasible and practical, to a land capability similar to that which existed prior to mining and that the management level required to utilise the rehabilitated land is within the means of the farmer who uses it.</li> <li>Ensure that the site is appropriately rehabilitated so that it does not cause surface water, groundwater or air pollution and that it is structurally stable.</li> <li>Demolish all mine infrastructure that cannot be used by a subsequent land owner or a third party. The areas that are demolished will be rehabilitated to at least a grazing land capability.</li> <li>Clean up all material stockpiles and loading areas and rehabilitate these to at least a grazing capability.</li> </ul>	The primary objective is to return land to a viable land use, which is within the expectation of the land owner.
Plant, office and infrastructure areas (including support infrastructure, powerlines, pipelines, tanks etc.)	<ul style="list-style-type: none"> <li>Ensure that clear communication takes place between the Mine and land owners, to establish which infrastructure subsequent land owner wishes to retain on site.</li> <li>Plant infrastructure that cannot be used by subsequent parties will be demolished and sold as scrap. The foundations of all demolished structures will be excavated and disposed of at the nearest permitted landfill site.</li> <li>All mine infrastructure that cannot be used by a subsequent landowner or some other third party will be demolished and removed off site to a permitted facility. The areas that are demolished will be rehabilitated to at least a grazing land capability. The foundations will be removed to 1 m below ground level. The disturbed area will be shaped to enable it to blend in with the surrounding landscape and to ensure that it is free draining. Topsoil will be placed over the cleared area and areas will be</li> </ul>	<p>The objective is to ensure that redundant infrastructure is removed and areas returned to the agreed-upon land use.</p> <p>Furthermore, it must be ensured that no facility or infrastructure remains on site that can present long-term pollution risks.</p>

Mine Area	Closure Actions	Closure Objective
	<p>vegetated.</p> <ul style="list-style-type: none"> <li>• Inert ceramics such as bricks, concrete, gravel etc. will be used as backfill or disposed of in a permitted waste disposal site.</li> <li>• Inert waste, which is more than 1 m underground, such as pipes will be left in place.</li> <li>• The company contracted to supply fuel will be requested to remove all fuel storage and reticulation facilities.</li> <li>• The rehabilitation objectives will be to return the land to grazing land capability except for those areas where structures or roads are taken over by someone else.</li> <li>• Where soil has been contaminated by spills of coal, hydrocarbons, etc. the soil must be appropriately ameliorated to support plant growth.</li> </ul>	
Pollution Control Dams	<ul style="list-style-type: none"> <li>• The pollution control dams will become evaporation dams (wilderness land) at and after closure. During decommissioning activities, dirty water will continue to be fed into it, but once the plant area and other dirty areas have been fully rehabilitated and maintained for three years, runoff from these areas will be accepted to be clean and allowed to discharge.</li> <li>• After this period, water from the PCDs will be pumped and all infrastructure removed for re-sale or disposal at permitted sites.</li> <li>• Rehabilitation of the area will ensure that the site is free-draining.</li> </ul>	The objective is to ensure that runoff from areas posing a pollution risk is contained until the risk is eliminated.
Roads and fences	<ul style="list-style-type: none"> <li>• Negotiations will take place with local farmers to establish which sections of roads and / or fences they will require.</li> <li>• Roads not required by subsequent landowners will be cross-ripped and then vegetated.</li> </ul>	The objective is to ensure the optimal use of existing infrastructure and the removal of redundant infrastructure.



Mine Area	Closure Actions	Closure Objective
	<ul style="list-style-type: none"> <li>• Unwanted / redundant fences will be dismantled and removed (including the demolition and removal of concrete fence foundations).</li> <li>• The final profile of the fill must be convex so that drainage is radially outwards, or erosion deflection berms should be erected to prevent erosion.</li> </ul>	
Excavations	<ul style="list-style-type: none"> <li>• All excavations will be backfilled as part of the rollover mining in opencast areas. Adit boxcuts will be backfilled upon decommissioning, after sealing of the adit.</li> <li>• Backfilled areas will be shaped to ensure that they are free draining</li> </ul>	The objective is to ensure that no unsafe excavations remain on site.
Stockpiles and Stockpile areas	<ul style="list-style-type: none"> <li>• Remove any remaining materials such as gypsum, coal, etc. and dispose of at a designated site.</li> <li>• Apply lime and fertilizer after soil testing.</li> <li>• Rip and scarify.</li> <li>• Apply subsoil and topsoil and re-vegetate.</li> </ul>	The objective is to ensure that stockpile areas are rehabilitated to a productive state, and that no carbonaceous material that could pose a pollution risk remain on surface.
Explosives Magazine	<ul style="list-style-type: none"> <li>• Demolish all structures and remove terracing and foundations to 1m below the original ground level.</li> <li>• Remove waste materials.</li> <li>• Rip and scarify, apply topsoil, profile and vegetate.</li> </ul>	The objective is to ensure that the site is left in a safe and sustainable state.

### 5.1.1 Post-mining Land Capability

The South African criteria for post mining arable, grazing, wilderness and wetland capabilities classes are defined in the Guidelines for the rehabilitation of mined land, by Chamber of Mines of South Africa/Coaltech (2007). Soil cover depth is the main property used to classify the post mining landscape as follows:

- ARABLE: soil depth exceeds 0.6 m, the soil material must not be saline or sodic and the slope (%) will be such that when multiplied by the soil erodibility factor K, the product will not exceed 2.0;
- GRAZING: soil depth will be at least 0.25 m;
- WILDERNESS: soil depth is less than 0.25 m but more than 0.15m; and
- WETLAND: depths as for grazing but use wetland soils which have been separately stockpiled.

The following soil management action plan is proposed (Jackson, 2018):

**Table 12: Action Plan for Soil Management**

Phase	Management action	Timeframe implementation	for	Responsible party
Construction	Bush clearing of all indigenous bushes and trees taller than one meter;	This activity should be finished at least a week prior to any stripping of top soil.		Holder / Contractor
	Assign all access routes so that only designated routes are used to minimise additional impact areas;	This activity should be finished at least two weeks prior to commencement of any mining activities.		Holder and ECO
	Stripping of topsoil;	During the first month		Holder, ECO, Contractor
	Stockpile the stripped soils in designated stockpile areas;	During and after the soil stripping process.		Holder, ECO, Contractor
	Vegetate these stockpiles;	During and after the completion of the stockpiles.		Holder, Contractor
Operation	Continuously monitor erosion on site;	During the timeframe assigned for the Life of Mine (LOM).		Holder
	Monitor compaction on site;	During the timeframe assigned for the Life of Mine (LOM).		Holder
Decommissioning	Assign proper storm water management plans;	This activity would be part of the engineering layout during the construction phase. A site-based assessment should be carried out two months prior to the		Holder, ECO

Phase	Management action	Timeframe for implementation	Responsible party
		decommissioning phase to ensure that all storm water management plans are adequate.	
	After the completion of the project the area is to be cleared of all infrastructure;	Within the first two months after the completion of the project.	Holder, ECO, Contractor
	Topsoil to be replaced for rehabilitation purposes;	After the completion of the foundation removal.	Holder, ECO, Contractor
Rehabilitation and closure	All rehabilitated areas should be assessed for signs of compaction, fertility and erosion;	Within the first month after the successful decommissioning of the area.	Holder
	The soils fertility must be assessed by a soil specialist yearly (during the dry season so that recommendations can be implemented before the start of the wet season) as to correct any nutrient deficiencies;	Within the first month after successful rehabilitation as well as yearly for the next 5 years to ensure that a sustainable soil resource is established.	Holder
	Compacted areas are to be ripped to loosen the soil structure and vegetation cover re-instated;	Monitoring compaction should take place every six months. In cases where compaction is identified, ripping should take place within the next month after detection.	Holder
	If erosion occurs, corrective actions (erosion berms) must be taken to minimize any further erosion from taking place;	Monitoring erosion should take place every six months whilst monitoring for compaction. In cases where erosion is identified, relevant mitigation measures should take place within the next month after detection.	Holder

A final post-mining land capability assessment and post rehabilitation performance assessment should be done progressively during the operational phase. This will ensure that soil capability targets are being achieved and aid in the compilation of a final post-mining land capability map, which should be submitted for closure purposes.

## 5.2 Alternatives

It is believed that the identified post-closure land use is the most viable closure option and no further post-closure land use alternatives were evaluated. The proposed post-closure land use resembles the pre-mining land use as a mixture of arable, grazing and wilderness land capability.

Infrastructure that has no future use on site will be demolished and sold or recycled where possible or disposed of at licensed facilities. As Chelmsford Colliery is still 25+ years from closure, negotiations with land owners regarding infrastructure (including fences, roads, buildings etc.) to remain on site or to be removed as part of decommissioning will be undertaken nearer the time of decommissioning of each of the Mine Sections.

## 5.3 Closure Actions

The following closure actions are to be implemented for the different aspects at the various mine sections:

### 5.3.1 Infrastructure Removal

On closure, all scrap metal will be removed and sold where possible or disposed of at an appropriate site. Offices, administration block and associated buildings will be removed from site, where these have no future use for the land owner (this must be negotiated with the land owner prior to decommissioning of any section of the Mine).

Building rubble and material will be transported to an appropriately licensed disposal site. Where this material is neutral and will not produce leachate harmful to the groundwater environment, it can be utilised as infill material at the base of voids if additional material is required. The footprint should be thoroughly cleaned and all building rubble and waste material should be removed. The footprint should be loosened by ripping the surface soils.

All fences not required / desired by the land owner will be dismantled and either disposed of at a permitted disposal site or sold as scrap. Fences erected to cordon off dangerous areas will remain in place and maintained. These will only be removed once such sites are considered safe and stable.

Roads or sections of roads no longer required after completion of mining will be identified in consultation with the land owner. These roads will be ripped, scarified and re-vegetated.

The pollution control dam at each section will remain on site to ensure the protection of the surrounding environment. This will only be rehabilitated once the area is stable and runoff water from the area is of a quality suitable for discharge into the environment.

Underground mining sections will be sealed at the adits. This will further assist in compartmentalising and containing groundwater within mining areas and reduce risk of contamination.

### 5.3.2 Soils and Vegetation

The soil handling through the successive roll-over mining process has been detailed in Table 12 and must be applied to ensure adequate rehabilitation of the opencast areas.

The soil fertility status should be determined by soil chemical analysis after levelling (before seeding/re-vegetation), and soil amelioration should be done as recommended by a soil specialist, in order to correct the pH and nutritional status before re-vegetation.

The rehabilitated sections should be re-vegetated with a grass mixture dominated by local climax species in early summer to stabilize the soil, or as recommended by the soil specialist.

A short-term fertilizer program should be based on the soil chemical status after the first year in order to maintain the fertility status for 2 to 3 years after rehabilitation until the area can be declared as self-sustaining.

Once the seed mixture is sown, the land must be rolled using a Cambridge roller to ensure consolidation around the seeds and effective moisture retention. Seeded lands are to be checked after germination has occurred, via soil sample analysis and visual surveys conducted on a monthly basis. Following the results of this sampling, post dressing of fertiliser should be considered. Where poor germination or cover is noted, these areas will be reseeded or hand-planted with seedling plugs. Once the area has been rehabilitated and seeded, access to the area should be restricted (to prevent grazing / trampling preventing effective vegetation establishment).

A floral assessment should be completed on an annual basis during decommissioning and closure to ensure plant communities are well established.

Wetland areas that have been mined through and rehabilitated; and wetland areas within 100m of rehabilitated areas are to be surveyed monthly and annually audited by a wetland specialist to ensure the sites become sustainable in the long term.

## 5.4 Relinquishment Criteria

The ultimate objective of closure is to ensure that appropriate closure certification is obtained. This can only be achieved upon acceptance from the DMR that all obligations associated with decommissioning, closure and rehabilitation (including post-closure monitoring and mitigation of latent and residual environmental impacts) have been met.

Criteria for relinquishment have to be set to ensure that all parties (the Holder of the Right and the Regulatory Authority) have clearly defined targets that need to be met prior to closure being approved.

Relinquishment criteria have to be set for each activity and infrastructure component in the context of the environmental aspects upon which the mine could impact.

Relinquishment criteria for each environmental aspect of the Mine are presented in Table 13.

**Table 13: Relinquishment Criteria**

<b>Environmental Aspect</b>	<b>Relinquishment Criteria</b>	<b>Monitoring and Reporting requirements</b>
Groundwater	Groundwater quality complies with the stipulations of the WUL.	Quarterly groundwater monitoring and reports.
Surface Water	Surface Water Quality complies with stipulations of the WUL.	Monthly Surface Water monitoring and quarterly reports.
	Surface Water ponding is not observed on site and the site is free-draining.	Visual inspection on rehabilitated areas. Closure reports.
	No redundant surface water management infrastructure remains on site.	Visual inspection of surface water management infrastructure.
Soils and Land Capability	No contaminated soils on site (Part 8 of NEM:WA confirmed not applicable).	Soil contamination assessment to be completed on all areas where hydrocarbon or other chemical spillages could have occurred.
	Soil chemistry and depth appropriate to post-closure land use in different areas, as per post-closure land use map.	
	No signs of erosion. Integrity of erosion prevention measures that have been established.	Visual inspection and agreement by land owner / authority.
Air Quality	Dust fallout, PM <sub>10</sub> and PM <sub>2.5</sub> compliant to NEM:AQA and Regulations.  No visible sources of atmospheric emissions on dust generating facilities remaining on site.	Monthly dust monitoring reports. Continuous PM <sub>10</sub> and PM <sub>2.5</sub> monitoring. Annual reporting to NAEIS.  Visual inspection.
Biodiversity	Establishment of indigenous vegetation on previously disturbed areas. The vegetation cover must be self-sustaining and over a three-year post closure monitoring period show that natural succession has occurred.	Annual Rehabilitation monitoring report
Safety and Stability	The site does not pose a health or safety risk to humans or animals. Subsidence not observed.	Visual inspections and sign-off by Engineer of all backfilled areas.
Waste	There is no waste material remaining on site.	Visual inspection and records of waste removal.

## 6 Concurrent Rehabilitation Commitments

The purpose of the Annual Rehabilitation Plan is to evaluate the concurrent rehabilitation undertaken in the preceding year, and plan for concurrent rehabilitation to be undertaken in the coming year.

Table 14 lists the different disturbed areas at the Chelmsford Colliery (planned and current) and identifies the concurrent rehabilitation activities that can be applied to each.

### 6.1 Shortcomings identified during the preceding 12 months

This is the first annual report compiled in terms of the FP Regulations for Chelmsford Colliery. Financial provision has been calculated in the past and Future Coal has a guarantee of R6,085,800.18 from Lombard Insurance Company for rehabilitation. Since the calculation of the previous Financial Provision, construction of the wash plant at Ashley Section has commenced.

The observed and measured height and number of overburden stockpiles at Ashley and Shelley Sections suggest that the Mine is somewhat behind on the backfilling of mined-out pits, through the mine has reported that Shelley Section will be completely backfilled before the end of 2018.

### 6.2 Planned rehabilitation for the forthcoming 12 months

The following rehabilitation actions are planned to take place:

- Completion of backfilling and revegetating at Shelley Section;
- Completion of backfilling of 20% and vegetating 20% of the opencast areas at Ashley Section;
- If the application to mine the Macclesfield Section via opencast methods is approved, mining and concurrent rehabilitation (backfilling) of Macclesfield Pit B, starting in the north of the pit footprint.

**Table 14: Rehabilitation and remediation activities**

Nature or type of activity and associated infrastructure	Planned remaining life of the activity	Area already disturbed or planned to be disturbed in the period of review (ha)	Percentage of the disturbed area available for concurrent rehabilitation	Percentage of the disturbed area on which concurrent rehabilitation can be undertaken	Notes to indicate why total available area differs from area already disturbed	Area planned to be rehabilitated and remediated during the plan under review	Actual area rehabilitation or remediated	Motivation indicating reasons for the inability to rehabilitate or remediate the full area
Plant and Infrastructure	30 years	0.17	0%	0%	Areas required to remain on site until end of Life of Mine. Thus, no rehabilitation planned for the forthcoming year.	0%		
Administration Area	30 years	0.27	0%	0%		0%		
Workshop Areas	30 years	0.30	0%	0%		0%		
Roads	30 years	42.89	0%	0%		0%		
Waste Facilities	n/a	10.28	0%	0%		0%		
Water Management Facilities	30 years	2.00	0%	0%		0%		
Ashley	30 years	30.49	50%	50%	Rehabilitation is currently being performed. Rehabilitation	20%	8.2628	Rehabilitation was only recently able to commence due



Nature or type of activity and associated infrastructure	Planned remaining life of the activity	Area already disturbed or planned to be disturbed in the period of review (ha)	Percentage of the disturbed area available for concurrent rehabilitation	Percentage of the disturbed area on which concurrent rehabilitation can be undertaken	Notes to indicate why total available area differs from area already disturbed	Area planned to be rehabilitated and remediated during the plan under review	Actual area rehabilitation or remediated	Motivation indicating reasons for the inability to rehabilitate or remediate the full area
					profile as per Figure 7 and Figure 8			to pit space constraints
Shelley	5 years	62.49	89%	89%	Rehabilitation is currently being performed. Rehabilitation profile as per Figure 5 and Figure 6.	10%	12.47	Rehabilitation was only recently able to commence due to pit space constraints

## 7 Latent and Residual Impacts

This section of the report aims to identify those impacts and risks that may only become manifest in future. The purpose of the identification of possible latent risks is to ensure that these risks are identified proactively, before they manifest or immediately as they manifest, to enable appropriate management measures to be implemented by the Mine.

This section therefore addresses the requirements of Regulation 5(c) and 6(c) of the FP Regulations 2015 (As amended).

### 7.1 Environmental risk assessment

An applicant or holder of right or permit must make financial provision for (inter alia) remediation and management of latent or residual environmental impacts which may become known in future, including the pumping and treatment of polluted or extraneous water (Regulation 5(c)).

The Financial provision must be determined through a detailed itemisation of all activities and costs required for remediation of latent or residual environmental impacts which may become known in the future, including the pumping and treatment of polluted or extraneous water, as reflected in an environmental risk assessment report (Regulation 6(c)).

These risks are considered latent as the impacts resulting from the risks may only manifest over time and are caused by the surface and underground disturbance associated with mining.

Ideally, all risk and impacts should be managed during the operational, decommissioning and closure phases of the Mine, and relinquishment criteria met, negating the possibility of latent impacts. However, residual and latent impacts to groundwater are expected to manifest, based on groundwater modelling that was undertaken to date.

For this reason, AMD and decant were identified as high-significance residual risks in the Risk Assessment undertaken in Section 4 (Table 9), and require further assessment in this section of the Report.

Risk Significance is a function of the severity of the risk and the probability that the risk will manifest, as shown in Table 15. Residual Risk refers to the significance of the risk after the consideration of management and mitigation measures.

**Table 15: Risk Assessment Methodology**

Probability		Consequence			
		1 – slight	2 – moderate	3 – significant	4 – severe
4 – highly likely	4: Moderate	8: High	12: Major	16: Major	
3 – probable	3: Moderate	6: High	9: High	12: Major	
2 – possible	2: Minor	4: Moderate	6: High	8: High	
1 – unlikely	1: Minor	2: Minor	3: Moderate	4: Moderate	

Results and findings of the risk assessment for the identified latent and residual risks are discussed below.

## 7.2 AMD and decant from coal seams and overburden

Groundwater modelling concluded that it is likely that AMD conditions will form from the coal seams and associated overburden material (shale). The high Sulphide – S percentages indicates that the acid conditions will be sustained in the long term. Leach test results show that pH and nickel concentrations are expected to exceed the SANS 241:2011 Drinking Water Standards in the post mining environment. The sulphate concentrations are expected to range between <5 to 135 mg/L in the post mining environment.

The expected decant points are shown in Figure 9. The expected decant volumes at each of the decant points have been calculated as follows:

- Ashley Opencast mining area (near unnamed tributary to the Nqusha River): 180 000 m<sup>3</sup>/a (495 m<sup>3</sup>/day or 5.7 L/s). The water levels in the Ashley opencast will reach pre-mining levels at 5 years after closure
- Macclesfield Opencast Mine (northern boundary nearest to the Horn River): 65 000 m<sup>3</sup>/a (180 m<sup>3</sup>/day or 2 L/s). The water levels in the Macclesfield opencast areas will reach pre-mining levels at between 20 and 13 years after closure
- Shelley Opencast B area (northern boundary, nearest to the unnamed, non-perennial tributary to the Ngagane River: 65 000 m<sup>3</sup>/a (180 m<sup>3</sup>/day or 2 L/s). The water levels in the Shelley opencast areas A and B will reach pre-mining levels at 3 and 9 years after closure

When the groundwater level in the rehabilitated opencast areas is above the lowest surface elevation point, decant onto surface will start.

The expected long-term water quality at Chelmsford is not expected to be excessively poor. While acid mine drainage conditions are expected to form, the majority of elements leaching from the rock material on site (stock piles, pit walls, underground mine area) are expected to comply with SANS241:2011 drinking water standards, with the exception of pH and nickel.

Monitoring boreholes must be installed in the rehabilitated opencast areas and below the expected decant points.

The optimal management option for management of AMD decant at Chelmsford is selected based on expected decant volumes and qualities. The decant points at Chelmsford are well suited to passive treatment due to the expected flow volumes of less than 50L/s and the low acidity loads. The following passive treatment options are potentially suitable to Chelmsford Colliery:

- Open/oxic limestone drains:
  - Acidity load < 150 kg/day, flow rates <20 L/s, pH > 2 and maximum pH attainable 6-8;
  - Requires limestone aggregate. May have a short operational life. Large areas may be required to operate successfully;
  - Low construction and operational costs.
- Anoxic limestone drains:
  - Acidity load < 150 kg/day, flow rates <20 L/s, pH > 2 and maximum pH attainable 6-8;

- Requires limestone aggregate carefully constructed drainage lines and gentle slopes. Synthetic lines might be required. May have a short operational life. Large areas may be required to operate successfully;
- Well suited to low acidity coal mines. Low construction and operational costs
- Anaerobic wetlands:
  - Acidity load < 1 kg/day per 200-500 m<sup>2</sup> of wetland area, flow rates of 1 – 5 days residence time, pH > 2.5 and maximum pH attainable 6-8;
  - Requires substrate of organic matter and/or limestone aggregate. Synthetic lines might be required. May have a restricted operational life if insufficient wetland area is available / insufficient mass of limestone or organic matter is available / the available limestone or organic matter porosity is insufficient;
  - Ongoing maintenance of anaerobic wetlands may also involve routine nutrient addition for bacterial growth, or replacement of limestone aggregate.
  - Anaerobic wetland construction is one of the generally used practises in South Africa.

The construction requirements for any of the three management options described above will include similar basic aspects, namely:

1. Decant collection system (sump or cut-off trench as relevant);
2. Channel or pumping system (from the collection system to the wetland or limestone drain); and
3. Wetland or limestone drain construction.

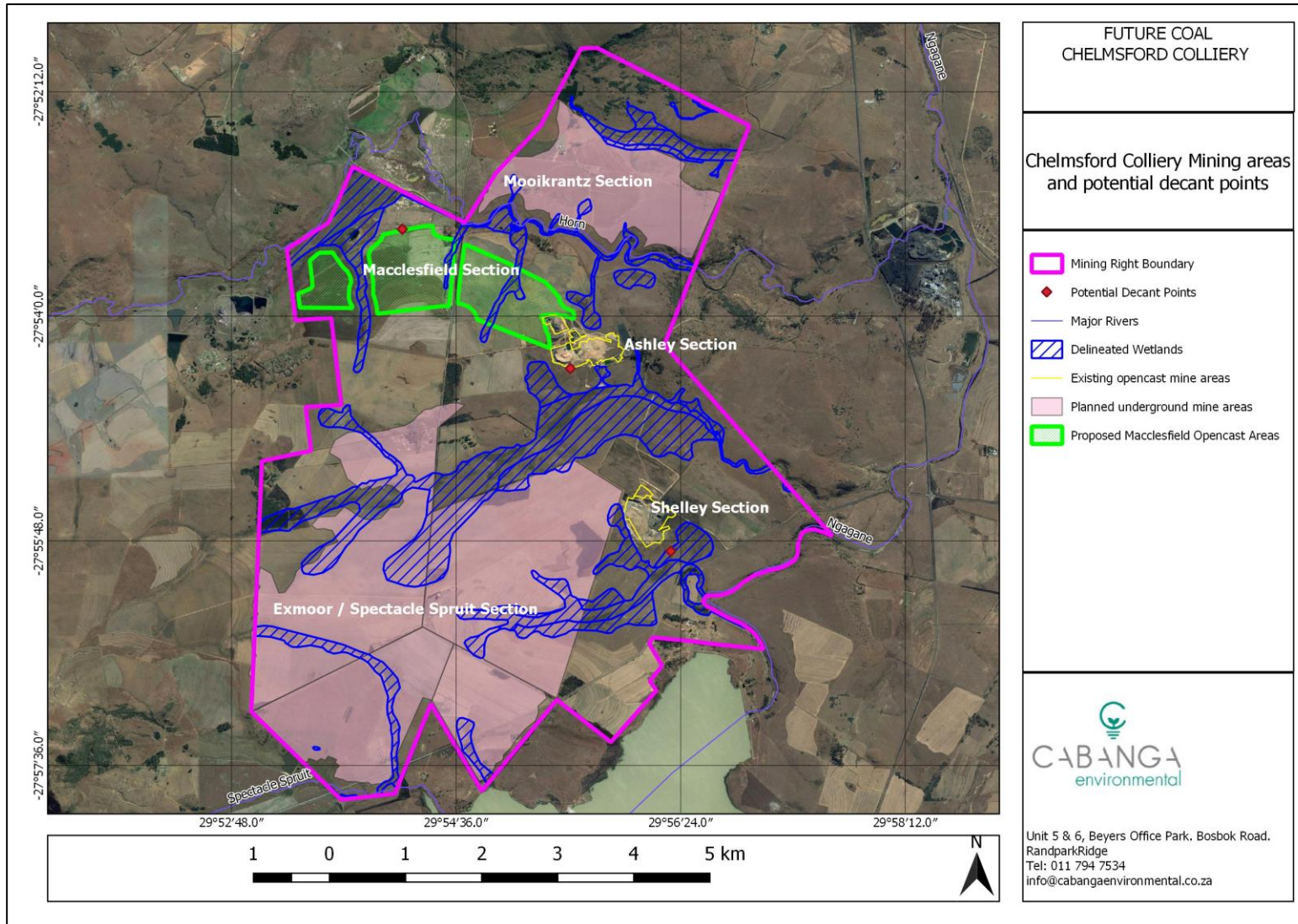
The information collected over the life of mine will be used to determine the wetland or drain sizes. It is recommended that the requirement and design of the AMD collection and treatment infrastructure be confirmed 2 years before the end of life of mine based on the actual collected dewatering volumes and water qualities.

### 7.3 Significance of latent risk

Table 16 summarises the significance of the risk of AMD decant at Chelmsford Colliery. The risk is first evaluated assuming no management other than the operational requirements included in Table 9. The residual risk after the implementation of the treatment measures discussed above is then assessed.

**Table 16: Latent and residual risk assessment**

Risk	No post-operational controls			Post-operational treatment (residual risk)		
	Probability	Consequence	Significance	Probability	Consequence	Significance
AMD formation and decant	Likely (3)	Significant (3)	High (9)	Highly Likely (4)	Slight (1)	Moderate (4)



**Figure 9: Potential decant points**

## 8 Assumptions, Limitations and Uncertainties

The following assumptions, limitations and uncertainties are relevant to this report:

- This closure and rehabilitation report was compiled in terms of the FP Regulations, 2015 (as amended) with due cognisance of the Draft FP Regulations, which have not been promulgated at the time of compiling this report;
- Survey information and detailed measurements from past financial provision assessments were not provided by the Mine, and infrastructure sizes were determined based on a review of aerial imagery and approved development plans;
- The most recent aerial survey was used to determine the volumes of pits and stockpiles at the Ashley and Shelley Sections. No aerial survey data for the remaining mine sections was available;
- The requirement and design of the AMD collection and treatment infrastructure must be confirmed 2 years before the end of life of mine based on the actual collected dewatering volumes and water qualities. Design criteria included in this report are conceptual only and must be refined using actual monitoring data as the Mine progresses;
- Costs calculated exclude VAT, preliminary and general fees (P&Gs) and contingency, but includes a CPI increase in the ten-year forecast. This is in line with the Draft FP Provisions;
- The calculations do not include any compensation for the value of assets at the time of mine closure or mine infrastructure salvage value; and
- The calculated cost includes post-closure monitoring for a period of three years.

## 9 Monitoring, auditing and reporting requirements

This section of the report contains the monitoring, auditing and reporting requirements relevant to the mine, specifically as they relate to the risk assessment, legal requirements and knowledge gaps.

Table 17 contains a summary of the auditing requirements that are and will continue to be implemented at the Mine, throughout the LoM (including the decommissioning and closure phases). The Table identifies the person responsible for undertaking the audit and the frequency of each auditing and reporting exercise.

In addition to compliance auditing, the mine must monitor various environmental aspects to ensure compliance to National Standards. These aspects include:

- Air Quality;
- Groundwater and Surface Water;
- Aquatic Ecology;
- Blasting and Vibration (none during decommissioning, closure phases);
- Wetlands, Alien Invasive Species and Rehabilitation success; and
- Soil and land capability.

Table 18 details the specific monitoring requirements that will remain relevant in the closure and decommissioning phases. Monitoring locations are shown in Figure 10.

All monitoring that requires the analysis of laboratory results will only be associated with SANAS accredited laboratories. Surface and groundwater monitoring will be undertaken according to the Mine's approved Water Use License. Air Quality and dust monitoring should be undertaken in accordance with the National Environmental Management Air Quality Act and the Regulations promulgated thereunder. Monitoring of ecological aspects will take place in accordance with the EMP. Auditing will be in accordance with the EIA Regulations, 2014 (as amended).

If the results of monitoring or auditing show the need to amend critical aspects of the Mine, the necessary applications for approval should precede implementation of alternative designs or methodologies (if authorisation is required). The application for authorisation for amendments will be associated with public participation, which is instrumental in identifying potential methods to manage or mitigate potential impacts. If adaptive or corrective actions are required to minimise impacts, the appropriate specialist team will be appointed to advise the mine on impact/risk reduction strategies.

Auditing requirements are summarised in Table 17.

**Table 17: Summary of Auditing requirements**

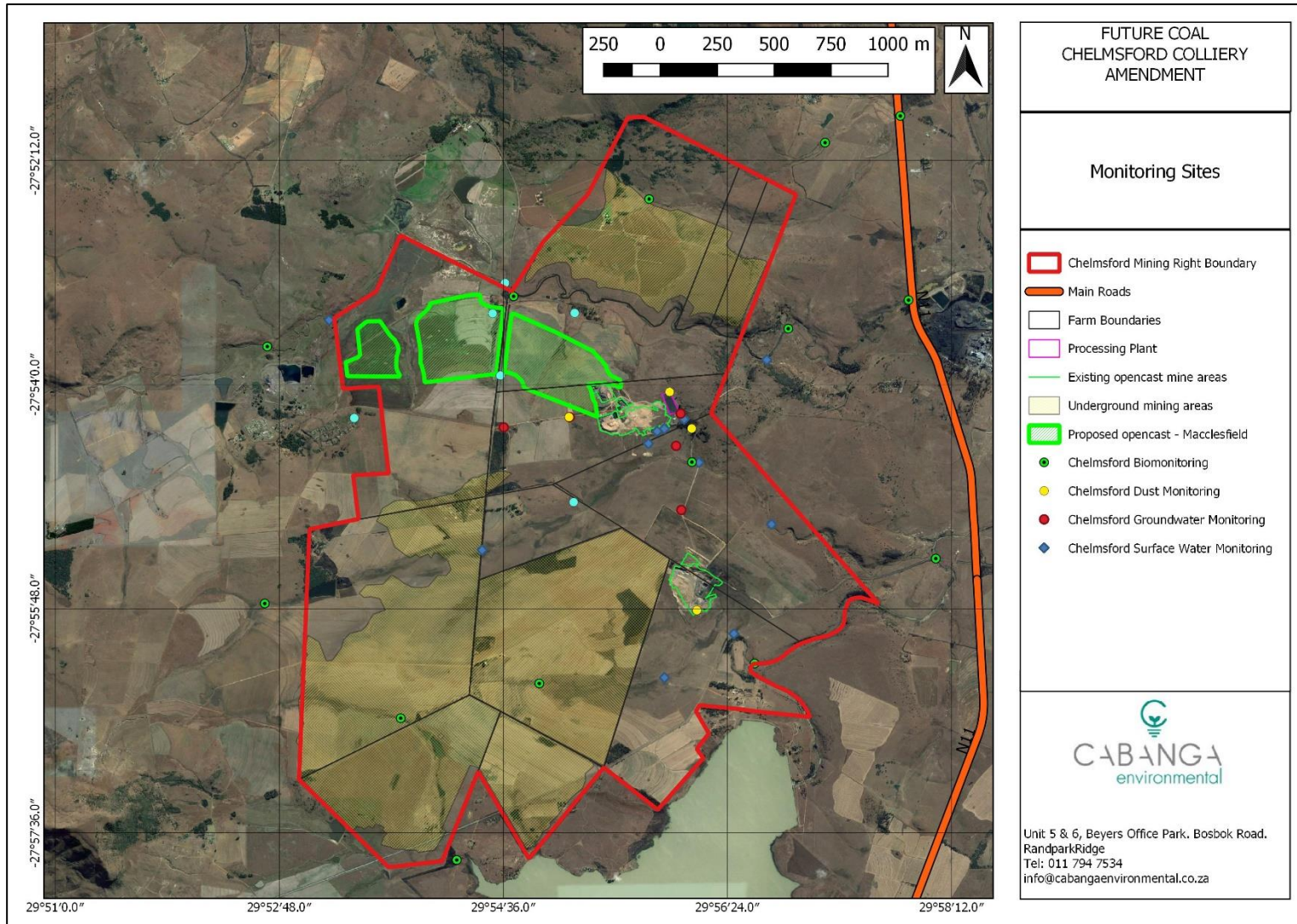
Aspect that requires Auditing	Auditing description	Person responsible for auditing	Frequency of audit	Reporting requirements
General compliance – all EMP commitments	Internal audits	ECO	Quarterly	Internal
	External Regulation Audits 34	Independent External Auditor	Annually	DMR (note: PPP to be undertaken if audit findings result in the need for EMP Amendment)
Financial Provision for Rehabilitation	Annual update of the quantum and FP Reports	Independent external specialist	Annually	Submit to DMR annually
IWUL and GN704 Compliance	Internal audits	ECO	Quarterly	Internal
	External Audits	Independent External Auditor	Annually	Submit to DWS Annually

**Table 18: Specific Monitoring Requirements**

Aspect that requires monitoring	Monitoring description	Person responsible for monitoring	Frequency of monitoring	Reporting requirements
Air Quality	A Continuous PM10 and PM2.5 monitor must be installed on site. It is recommended to install the monitor at Ashley Section offices (for security reasons).	ECO	Continuous	Annual reporting to NAEIS by 31 March
	Monthly Dust Fallout Monitoring must continue at the existing 4 buckets and an additional 4 buckets be included prior to mining at Macclesfield Section commencing. Results must be reported to NAEIS Annually.	Subcontractor	Monthly	Annual reporting to NAEIS by 31 March
Groundwater	Groundwater levels as per the IWUL	ECO	Monthly	Report to DWS if variance >10%
	Groundwater Quality as per the IWUL	ECO and external specialist,	Quarterly	Quarterly reports to DWS
Surface Water	Monthly surface water monitoring as per IWUL	ECO and external specialist,	Monthly	Monthly reporting to DWS
Aquatic Ecology	Aquatic Biomonitoring	Independent Specialist	Bi-annually (High and Low Flow)	Annual Report to DWS
Wetlands	Wetland monitoring.	Independent Specialist	Annually (Summer rainfall season)	Annual Report to DWS
Alien Invasive Species	Monitoring of the establishment and spread of Listed alien invasive species and problematic weed species, and comparison with previous year's results to show progress.	Vegetation specialist	Annually	Internal and to the Land Owner
Biodiversity	Rehabilitation Monitoring on rehabilitated areas to ensure	ECO	Monthly	Internal



Aspect that requires monitoring	Monitoring description	Person responsible for monitoring	Frequency of monitoring	Reporting requirements
	that proper succession has occurred and that there is no erosion occurring or alien invasive plants taking hold	External Specialist	Annually for 5 years after rehabilitation on an area	Internal and to the Land Owner and DMR
Soil and land capability	<p>The rehabilitated area must be assessed once a year for compaction, fertility, and erosion</p> <p>The soils fertility must be assessed by a soil specialist yearly (during the dry season so that recommendations can be implemented before the start of the wet season) as to correct any nutrient deficiencies</p>	Soil Specialist	Annually	Internal and to the Land Owner



**Figure 10: Monitoring Locations**

## 10 Quantum of Financial Provision

### 10.1 Closure Cost Methodology

The following steps were followed to calculate the closure cost at Chelmsford Colliery:

- Study the engineering plans and aerial photography of the site;
- Undertake a site visit to determine / confirm the presence and nature of the structures, facilities and infrastructure identified from the aerial photograph and mine design drawings;
- Measure the sizes of structures and infrastructure on site;
- Obtain rates for the demolition and / or removal of the various types of infrastructure and structures and the rehabilitation of areas from four different contractors, and calculate an average cost for removal of the different infrastructure/ structure types on the site, per area;
- Use the X;Y;Z and Ortho-Photo information provided by the Mine Surveyor to model (in Model Makers) the mine topography and design a closure topography; and
- Calculate the costs of infrastructure removal and site rehabilitation, by multiplying the areas calculated for each type of infrastructure with the rates provided by the contractors. Calculate the rehabilitation costs in terms of year 0 (immediate closure and rehabilitation, current situation) as well as concurrent rehabilitation of all infrastructure and structures on site over a ten-year period.

Please refer to Appendix B for the detailed closure cost calculations.

Modelmaker software was used to generate a detailed model of the Mine surface, and to calculate the volumes of cut and fill material required for backfilling of the opencast areas and shaping of areas. The model was also used to calculate the available material on site, to determine if the material on site is sufficient for cut-and-fill requirements. Details of the model are summarised in Figure 11.

<b>Ashley Model</b>	
----- MODEL MAKER -----	
Ken van Rooyen / Cabanga Concepts / 0929022254	Date : 19/8/2018 Time : 15:1
Volumes for	> C:\Users\ken\.MMSystems\MM\BackUp\B1\1.bot
File 1	> C:\Users\ken\Documents\Cabanga Enviro\Future Coal\Chelmsford\Ashley Model\2018\rehab modelling.MAL \
Project Description	> C:\Users\ken\.MMSystems\MM\BackUp\B1\1.bot
File 2	> \
Project Description	>
System Settings : Southern Hemisphere - Degrees - WGS84 - LO29	
-----	
VOLUME CALCULATIONS DONE ON A GRID OF 2.00 X 2.00m	
FINAL CUT AREA : 266776.00m2	CUT VOLUME : 582872.87m3
FINAL FILL AREA : 202212.00m2	FILL VOLUME : 590980.23m3

<b>Shelley Model</b>	
----- MODEL MAKER -----	
Ken van Rooyen / Cabanga Concepts / 0929022254	Date : 27/8/2018 Time : 12:10
Volumes for	> Area
File 1	> \
Project Description	> C:\Users\ken\.MMSystems\MM\BackUp\B1\Shelley
File 2	> \
Project Description	>
System Settings : Southern Hemisphere - Degrees - WGS84 - LO29	
-----	
VOLUME CALCULATIONS DONE ON A GRID OF 2.00 X 2.00m	
FINAL CUT AREA : 142116.00m2	CUT VOLUME : 351038.56m3
FINAL FILL AREA : 124728.00m2	FILL VOLUME : 294837.46m3
=====	

**Figure 11: Model details**

## 10.2 Closure Cost Estimate

The total calculated financial provision for 2018 is RXXX, as summarised in Table 19.

**Table 19: Closure Cost Estimate Summary**

MINE SECTION	AREA	TOTAL CALCULATED CLOSURE LIABILITY
Ashley	Opencast	6,182,506
	Workshop	1,602,449
	Plant	871,981
Shelley	Opencast	4,277,098
	Crush & Screen	461,407
Admin	Offices	120,340
Rehabilitation	Environmental Monitoring	20,000
<b>TOTAL</b>		<b>R13,535,781</b>

## 11 Conclusion

The total calculated financial provision is R13,535,780.

Currently, Chelmsford colliery holds guarantees for R6,085,800.15 from Lombard Insurance Company.

Chelmsford Colliery is required to:

- Update the Guarantee to the newly calculated closure cost;
- Continue with concurrent rehabilitation; and
- Continue to undertake annual updates of the financial provision and this report in accordance with the relevant Regulations applicable at the time.

## 12 References

- Claassen, L. (2018). *Basic Assessment Report: Application for Amendment of Mining Right and Environmental Management Plan and Application for Environmental Authorisation for the proposed opencast mining on Macclesfield Section, Chelmsford Colliery, KZN*. Johannesburg: Cabanga Environmental (Draft for Public Review).
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- Kasl, B. (14 December 2016). *Integrated Water and Waste Management Plan for the opencast and underground mining at Chelmsford Colliery*. Johannesburg: Canganga Environmental.
- Mucina, L., & Rutherford, M. C. (2006). *Reprint 2011. The Vegetation of South Africa, Lesotho and Swaziland*. Pretoria: Strelitzia 19. South African National Biodiversity Institute.
- Van Hoven, P. W., & Needham, R. (May 2012). *Future Coal (Pty) Ltd Chelmsford Colliery II Environmental Impact Assessment + Environmental Management Plan*. Pretoria: Prodigy Trading (Pty) Ltd.

## **Appendix A: A3 Maps and Plans**

### **Plan 1: Locality Map**

Please see Figure 1

### **Plan 2: Site Plan**

- 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

### **Plan 3: Detailed Mine Plan**

- the mine plan and schedule for the full approved operations, and must include—
  - appropriate description of the mine plan;
  - drawings and figures to indicate how the mine develops;
  - what areas are disturbed; and
  - how infrastructure and structures (including ponds, residue stockpiles etc.) develops during operations

Please see Figure 3 and Table 14

### **Plan 4: Proposed final post-closure land use**

- a map of the proposed final post-mining land use

Please see Figure 5, Figure 6, Figure 7 and Figure 8.

**Appendix B: Detailed Closure Cost Calculations**

Mine:	Chelmsford		Location:	Newcastle			X:		Y:		2018	R 13,535,780.97		
Activity	Item		Ashley			Shelley			Admin	Site:	Total	Factors	Rates per	Total Costs to be include in BNRT 2 when new regulations are promulgated.
			Opencast	Workshop	Plant	Open Cast	Crush& Screen	0	Offices	Units Size	Units Size		Units Size	
Concrete	Concrete Re-inforced	m <sup>3</sup> (thick)		88.5	1000						1088.5	0.6	R 350.00	R 228,585.00
	Concrete Re-inforced	m <sup>3</sup> (thin)									0			R 0.00
	Concrete Structures	m <sup>3</sup> (thick)		651.2							651.2	0.3	R 12.00	R 2,344.32
	Concrete Structures	m <sup>3</sup> (thin)									0			R 0.00
	Concrete Installations	m <sup>3</sup> (thin)									0			R 0.00
	Concrete Installations	m <sup>3</sup> (thin)									0			R 0.00
Material handling	Material - Stockpile <b>removal</b>	m <sup>3</sup>									0			R 0.00
	Material - Stockpile <b>Areas</b>	m <sup>2</sup>			32310		17286				49596		R 15.23	R 755,347.08
	Material - Sub Soils <b>placement</b>	m <sup>3</sup>									0			R 0.00
	Material - Sub Soils <b>Area</b>	m <sup>2</sup>				42439					42439		R 15.23	R 646,345.97
	Material - Topsoil <b>placement</b>	m <sup>3</sup>									0			R 0.00
	Material - Topsoil <b>Areas</b>	m <sup>2</sup>									0			R 0.00
	Material - Hards <b>placement</b>	m <sup>3</sup>									0			R 0.00
	Material - Hards <b>Areas</b>	m <sup>2</sup>	49762								49762		R 22.95	R 1,142,037.90
	Material - Excavation	m <sup>3</sup>									0			R 0.00
	Material - Trenching	m <sup>3</sup>									0			R 0.00
Mining	Mining - Void <b>Area</b>	m <sup>2</sup>	89224			71290								R 0.00
	Rehab handling Type										0			
	Adit sealing Concrete Volume	m <sup>3</sup>									0			R 0.00
	Mining - Spon. Combustion areas	ha									0			R 0.00
	Mining - Surface subsidence	ha									0			R 0.00
	Mining - Highwall stabilization	ha									0			R 0.00
	Predicted Decant	m <sup>3</sup> /day									0			R 0.00
Parking Area	Park area - Tar	m <sup>2</sup>									0			R 0.00
	Park area - Paving	m <sup>2</sup>									0			R 0.00
	Park area - Gravel	m <sup>2</sup>	18181	1563		4151			891		24786		R 40.00	R 991,440.00
Rail	Rail - Electrified	m									0			R 0.00
	Rail - Non-electrified	m									0			R 0.00
Rehabilitation	Clean up - Dirty area	m <sup>2</sup>									0			R 0.00
	Rehab - Level areas	m <sup>3</sup>	63226								63226		R 22.95	R 1,451,036.70
	Rehab - topsoil areas	ha									0			R 0.00
	Rehab - Vegetate areas	ha	15.245			42.891					58.136		R 50,000.00	R 2,906,800.00
	Rehab - Maintenance (L %)	ha	15.245			42.891					58	60%	R 30,000.00	R 1,046,448.00
	Rehab & Closure Monitoring		8.2628			12.4728					20.7356		R 20,000.00	R 20,000.00
	Rehab - Fencing	m									0			R 0.00
	Rehab - Contour drains	m									0			R 0.00
	Rehab - Down Drains Concrete	m									0			R 0.00
Rehab - Down Drains Grassed	m									0			R 0.00	



	Rehab - Other	ha								0			R 0.00	
Roads	Roads - Tar Access	m <sup>2</sup>								0			R 0.00	
	Roads - Paved Access	m <sup>2</sup>								0			R 0.00	
	Roads - Earth Access	m <sup>2</sup>	10500			12330		1400		24230		R 40.00	R 969,200.00	
	Roads - Haul	m <sup>2</sup>	9894			4776	6534			21204		R 11.50	R 243,846.00	
	Buildings - Brick	m <sup>2</sup>						329		0			R 0.00	
Structures and Buildings	Buildings - Car ports	m <sup>2</sup>								0			R 0.00	
	Buildings - Portable cabins	m <sup>2</sup>	18.5	208				56		282.5		R 500.00	R 141,250.00	
	Structures Steel	m <sup>3</sup> (heavy)	256.5	88.5						345		R 5,000.00	R 1,725,000.00	
	Structures Steel	m <sup>3</sup> (light)		159			24.6			183.6		R 5,000.00	R 918,000.00	
	Structure - Diesel tanks	N <sup>o</sup>		2						2		R 150.00	R 300.00	
	Structure - Weigh bridge	m <sup>2</sup>		32						32			R 0.00	
	Structures - Containers	N <sup>o</sup>											R 0.00	
	Structures - Substation	N <sup>o</sup>								0			R 0.00	
	Structures - Powerlines	km								0			R 0.00	
	Waste facilities	Waste - Facility removal	N <sup>o</sup>								0			R 0.00
		Waste Liquid - Lining <sup>(New)</sup>	m <sup>2</sup>			1699					1699		R 100.00	R 169,900.00
Waste Liquid - Lining <sup>(Replacement)</sup>		m <sup>2</sup>		1765						1765		R 100.00	R 176,500.00	
Waste Solid - Lining <sup>(New)</sup>		m <sup>2</sup>								0			R 0.00	
Waste Solid - Lining <sup>(Replacement)</sup>		m <sup>2</sup>								0			R 0.00	
Cladding Dump/Dam		ha								0			R 0.00	
Vegetation Top		ha								0			R 0.00	
Vegetation Sides		ha								0			R 0.00	
Water Management	Predicted Decant	m <sup>3</sup> /day								0			R 0.00	
	Water Treat - Active <sup>(Capex)</sup>									0			R 0.00	
	Water Treat - Active <sup>(Opex)</sup>									0			R 0.00	
	Water Treat - Passive <sup>(Capex)</sup>									0			R 0.00	
	Water Treat - Passive <sup>(Opex)</sup>									0			R 0.00	
	Water - Conservancy/septic tanks N <sup>o</sup>			1				1		2		R 700.00	R 1,400.00	
Water - Percentage flooded %									0			R 0.00		

**Table 20: Rates used in the closure cost calculations**

Item	Activity	Average contractors rates
Earth Moving	Spoils volume levelling m <sup>3</sup> (Dragline)	R 60.00
	Spoils volume levelling m <sup>3</sup> (Truck and shovel)	R 44.10
	Cost per m <sup>3</sup> to Dozer within 90m	R 25.14
	Cost per m <sup>3</sup> (Truck and shovel) to fill within 90m	R 41.10
	Cost per m <sup>3</sup> (Truck and shovel) to profile within 1km	R 45.35
	Rate per extra Km earth moving (Hauling)	R 8.04
	Cost per m <sup>3</sup> Excavation	R 42.88
	Cost per m <sup>3</sup> Trenching	R 105.38
Waste Facilities	Acidic waste Dumps/dams <b>Sides</b> vegetation (ha)	R 120,166.67
	Acidic waste Dumps/dams <b>Top</b> vegetation (ha)	R 112,500.00
	Alkaline waste Dumps/dams <b>Top</b> vegetation (ha)	R 10,000.00
	Alkaline waste Dumps/dams <b>Sides</b> vegetation (ha)	R 12,000.00
	<b>Install</b> Concrete lining m <sup>2</sup> (0.3mthick)	R 950.00
	<b>Remove</b> and dispose Concrete lining from waste dams m <sup>3</sup>	R 1,016.20
	<b>Install</b> Plastic lining for waste dams m <sup>2</sup>	R 91.67
	<b>Remove</b> and dispose Plastic lining for waste dams m <sup>3</sup>	R 23.33
	<b>Install</b> Clay lined waste dam m <sup>2</sup>	R 193.33
	<b>Remove</b> and dispose Clay lined waste dam m <sup>2</sup>	R 48.70
Final Rehabilitation (ha)	topsoil areas (ha)	R 126,125.00
	vegetate areas (ha)	R 50,000.00
	Alien invasive eradication (ha)	R 50,000.00
	Contour drains (m)	R 47.54
	Down drains (m) <sup>(Vegetated)</sup>	R 131.67
	Down drains (m) <sup>(Concrete)</sup>	R 691.67
Brick Buildings m <sup>2</sup>	Cost per m <sup>2</sup> of floor to demolished and dispose within 1km	R 1,366.67
	Rate per extra Km to Dispose	R 14.00
Car ports m <sup>2</sup>	Cost per m <sup>2</sup> to demolished and dispose within 1km	R 766.67
	Rate per extra Km to Dispose	R 14.00
Concrete Structures m <sup>3</sup>	Cost per m <sup>3</sup> (Re-in forced) demolished and dispose within 1km	R 783.33
	Cost per m <sup>3</sup> (normal Concrete) demolished and dispose within 1km	R 537.33

Item	Activity	Average contractors rates
	Install Concrete Floor m <sup>2</sup> (0.3mthick)	R 950.00
	Sealing of Adits or Shafts m <sup>3</sup>	R 2,370.00
	Rate per extra Km to Dispose	R 14.00
Diesel tanks and oils #	Cost to remove <b>above</b> ground	R 2,050.00
	Cost to remove <b>below</b> ground	R 3,450.00
	Clean up area/tank (each) m <sup>2</sup>	R 50.00
French drains/septic tanks	Lift and dispose of within 50km	R 16,900.00
	Lift and dispose of within 100km	R 33,800.00
Portable cabins etc. m <sup>2</sup>	Lift remove and clean base/m <sup>2</sup>	R 833.33
Rail line	Lift electrified line and ballast/m	R 1,133.33
	Lift non- electric line and ballast/m	R 783.33
Roads and parking m <sup>2</sup>	Lift remove <b>Tar base</b> and clean base/m <sup>2</sup>	R 205.00
	Lift remove <b>Paving base</b> and clean base/m <sup>2</sup>	R 38.33
	Lift remove <b>earth base</b> and clean base/m <sup>2</sup>	R 146.67
Steel Structures m <sup>3</sup>	Demolish and remove from site/m <sup>3</sup> (Light)	R 2,666.67
	Demolish and remove from site/m <sup>3</sup> (Heavy)	R 3,333.33
	Demolish and remove from site/m <sup>3</sup>	R 4,500.00
Substation and Power lines m <sup>2</sup>	Remove and demolish (each)	R 250,000.00
	Power lines per Km	R 150,000.00
Decant volumes m <sup>3</sup> treatment	Water treatment plant 2500m <sup>3</sup> /day	R 15,000.00
	Water treatment plant 1000m <sup>3</sup> /day	R 12,000.00
	Water treatment plant 2000m <sup>3</sup> /day	R 12,000.00
Spontaneous Combustion areas	Site specific	R 15,000.00
Surface subsidence (ha)	Grade and fill crack (100m)	R 6,698.33
	Cut for free draining m <sup>3</sup>	R 50.00
Post Closure	Monitoring water	R 5,000.00
	Dust closure monitoring	R 5,000.00
	Vegetation Monitoring	R 5,000.00
	Revegetating cost per ha	R 25,000.00
	Subsidence monitoring	R 5,000.00

Item	Activity	Average contractors rates
	Spontaneous combustion monitoring	R 5,000.00
	Erosion monitoring	R 5,000.00
Site establishment Costs	Grader <small>Number required</small>	R 20,666.67
	Dozer <small>Number required</small>	R 27,333.33
	Excavator <small>Number required</small>	R 20,666.67
	Tipper <small>Number required</small>	R 9,333.33
	Hauler <small>Number required</small>	R 10,666.67
	TLB <small>Number required</small>	R 12,000.00