



## mineral resources

Department:  
Mineral Resources  
REPUBLIC OF SOUTH AFRICA

# Basic Assessment Report And Environmental Management Programme

for Listed Activities Associated with Mining Activities

## Environmental Authorisation in Support of the Mining Right Application for Portions of the Farm Rietfontein 152

*SUBMITTED FOR ENVIRONMENTAL AUTHORISATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) (NEMA) AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 (ACT NO. 59 OF 2008) (NEM:WA) IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (ACT NO. 28 OF 2002) (MPRDA) (AS AMENDED).*

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<b>File Reference Number SAMRAD:</b>	FS 30/5/1/2/2/ 164 MR



This document has been prepared by Digby Wells Environmental.

<b>Report Type:</b>	<b>Basic Assessment Report and Environmental Management Programme</b>
<b>Project Name:</b>	<b>Environmental Authorisation for the Mining Right Application for a Portion of the farm Rietfontein No. 152</b>
<b>Project Code:</b>	<b>COP3706</b>

<b>Name</b>	<b>Responsibility</b>	<b>Signature</b>	<b>Date</b>
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## IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining “will not result in unacceptable pollution, ecological degradation or damage to the environment”.

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3)(b) of the EIA Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of section 17 (1) (c) the competent Authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

**It is therefore an instruction that** the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or a permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulation and will lead to the Environmental Authorisation being refused.

**It is furthermore an instruction that** the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

## OBJECTIVE OF THE BASIC ASSESSMENT PROCESS

The objective of the basic assessment process is to, through a consultative process—

- determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
- identify the alternatives considered, including the activity, location, and technology alternatives;
- describe the need and desirability of the proposed alternatives,
- through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:
  - the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
  - the degree to which these impacts—
    - can be reversed;
    - may cause irreplaceable loss of resources; and
    - can be managed, avoided or mitigated;
- through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—
  - identify and motivate a preferred site, activity and technology alternative;
  - identify suitable measures to manage, avoid or mitigate identified impacts; and
  - identify residual risks that need to be managed and monitored.

## EXECUTIVE SUMMARY

### Introduction

Copper Sunset Sand (Pty) Ltd (hereafter Copper Sunset) is the holder of an approved Environmental Management Programme (EMPr) and Mining Right (Reference: FS 30/5/1/2/2/164 MR) to mine sand on the Bankfontein Farm, Free State Province. In 2015, Copper Sunset applied to extend its Mining Right to incorporate a portion of the remaining extent of the Farm Zandfontein No. 259; a portion of the remaining extent of the Farm Bankfontein No. 9; and a portion of the Farm Rietfontein No. 152 which are all adjacent farms to its existing Mining Right. This application has since been approved, under Environmental Authorisation reference number: FS 30/5/1/2/3/2/1 (164) EM. Copper Sunset now wishes to further extend the expanded Mining Right area to incorporate an additional portion of the farm Rietfontein No. 152. This extended area is referred to as “the Mining Right extension”.

The Mining Right extension is for a total area of 19.9 ha for the mining of sand. There will be no infrastructure on the Mining Right extension area, which will continue to operate from the existing mining infrastructure. The mineral bearing potential of the Mining Right extension area is known to contain an extension of the deposit currently being mined by Copper Sunset, with an average depth of 2.7 m, yielding a total resource over the Mining Right extension area of approximately 900 000 cubic metres from all extended areas. This extension would increase the Life of Mine (LOM) by approximately 9 months in total.

### Project Applicant

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### Project Overview

The Mining Right extension is located on the following property:

- A portion of the Farm Rietfontein No. 152 (F0160000000015200000).

This farm portion is currently a part of the New Vaal Colliery, owned and operated by Anglo Operations (Pty) Limited and an agreement for the lease of the land for the mining activities is in place with Anglo.

Strip mining will be utilised, with the sand mined in strips of 30 – 35 m in width and 2.5 – 3 m in depth. The length of the strips is dependent on the area to be mined but approximate lengths are in the region of 180 – 600 m. The mining method to be applied includes:

- Stripping and stockpiling of topsoil;
- Construction of a temporary access road alongside the strip to be mined;
- Mining of the sand resources; and
- Backfilling of the mined excavations with the stockpiled topsoil.

There will be an overall lowering of the topography of the site, however rehabilitation will be undertaken to ensure the site is contoured and levelled to resemble the pre-mining landscape and that the surface is free draining. The site will be vegetated and the rehabilitation assessed by independent consultants. There will be no infrastructure construction taking place on the Mining Right extension. The extended mine will continue to operate from the existing mining infrastructure.

### Purpose of this report

The overarching objectives of this Basic Assessment Report are to:

- Describe the status quo of the biophysical and socio-economic environment of the project area through specialist studies undertaken;
- Identify and assess potential environmental impacts associated with the proposed Project; and
- Recommend mitigation and management measures to ensure that the development is undertaken in such a way as to minimise negative impacts. These are included in an Environmental Management Programme report (EMPr) in terms of the NEMA.

This Basic Assessment Report was submitted to the public for review and comments for a period of 30 days from Friday, 10 June 2016 to Monday, 11 July 2016. The details of the listed and specified activities that will be undertaken on the Mining Right extension, for application for environmental authorisation is being made, are set out in Table 1-1.

**Table 1-1: Listed and specified activities for the project**

Name of Activity	Aerial extent of the activity	Listed Activity	Applicable Listing Notice
Site clearance and vegetation removal	19.9 ha	X – Activity 27	GNR 983

Name of Activity	Aerial extent of the activity	Listed Activity	Applicable Listing Notice
Establishment of access roads / tracks	Alongside of the mine strip	Not Listed <sup>1</sup> Access roads will be less than 8m wide	Not Listed
Topsoil stockpiling	Piled along the 600 m mine strip	Not Listed	Not Listed
Mining of the sand resources	19.9 ha	Not Applicable (Activity 17 of GN R984 not applicable: existing mining right applies)	N/A
Backfilling of the mined excavations topsoil	19.9 ha	Not Listed	Not Listed
Rehabilitation (topsoil contouring, ripping and vegetation establishment)	19.9 ha	Not Listed	Not Listed

### Environmental Consultants

Digby Wells Environmental (Digby Wells) has been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the Basic Assessment Process and associated specialist studies for the inclusion of the expanded mining area. The details of the EAP have been provided below.

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<sup>1</sup> Copper Sunset will make use of an existing road that is not in use to access the proposed site from the current mining operation. Access roads / tracks will be determined based on the mining strip locations using the shortest route possible. These access routes will be less than 8 m in width and will therefore not trigger Activity 24 GNR 983.



## **Approach and Methodology for the Public Participation Process**

A Public Participation Process (PPP) has been designed to comply with the regulatory requirements set out in Regulation 44 and 45 of the Environmental Impact Assessment Regulations, 2014 (EIA Regulations, 2014)<sup>2</sup> and as required in Chapter 5 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The PPP is designed to provide Interested and Affected Parties (I&APs) with an opportunity to evaluate all aspects of the proposed project. The aim is to maximise the project benefits while minimising its adverse effects. This Basic Assessment Report was made available for public review for a period of 30 days from Friday, 10 June 2016 to Monday, 11 July 2016 at the publically accessible places (Zamdela Local Library and Vereeniging Public Library) as well as on the Digby Wells website ([www.digbywells.com](http://www.digbywells.com)).

## **Project Alternatives**

The Mining Right extension is adjacent to the current mining operations of Copper Sunset. The mineral bearing potential of the Mining Right extension is known as an extension of the deposit currently being mined by Copper Sunset. Due to the location of the Mining Right extension, no infrastructure will be constructed as the mined material will be transported to the current mining operations of Copper Sunset for the sand to be distributed to the local and regional construction clients. Therefore no location alternative was considered.

The previous extension of the Mining Right for Copper Sunset was to extend the LOM by a maximum of 15 months, with this application extending the LOM by a further 9 months. Should this Mining Right extension not be granted Copper Sunset's mining operations will come to a close by approximately September 2017 which may result in the mine closing.

The no-go option would result in the sand resources not being mined. As a result, the sand resource will not be available for the construction industry within the Gauteng and Free State Provinces which are reliant on Copper Sunset. Copper Sunset's current LOM is due to finish by the approximately September 2017. This Mining Right extension would increase the LOM by a total of 9 months.

The no-go option means that all those negative impacts associated with the project would not occur such as vegetation removal with a potential loss of species and habitat, possible siltation of surface water from dust creation and noise and air quality nuisance impacts.

Conversely, the socio-economic benefits of the project would not be realised. Currently, 24 skilled and multi-skilled personnel are employed by Copper Sunset; should the mining area not be expanded Copper Sunset's mining operations will come to an end by approximately September 2017 and the opportunity for continued employment for a further 9 months will not be realised.

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<sup>2</sup> Published in GN R 982 of 4 December 2014.



## Summary of the Potential Environmental Impacts

The Environmental Impact Statement is a summary of all the potential environmental impacts identified during each phase of the proposed project. The significance of the impacts associated with the biophysical environment, pre-mitigation and post-mitigation, is summarised in Table 1-2.

**Table 1-2: Summary of the Potential Impacts**

Project Activity	Potential Impact	Significance (Pre-Mitigation)	Significance (Post Significance)
Site clearance and vegetation removal Establishment of access roads Stockpiling of topsoil	Dust generation	Minor Negative	Negligible Negative
	Soil compaction and soil erosion	Minor Negative	Negligible Negative
	Loss of fauna and flora species	Moderate Negative	Minor Negative
	Sedimentation of wetlands	Negligible Negative	Negligible Negative
	Noise generation	Negligible Negative	Negligible Negative
Mining of sand resources Transportation of sand	Soil erosion	Minor Negative	Negligible Negative
	Sedimentation of surface water resources	Minor Negative	Negligible Negative
	Noise Generation	Negligible Negative	Negligible Negative
	Dust Generation	Moderate Negative	Minor Negative
	Continued Employment	Moderate Positive	Moderate Positive
Backfilling of the mined excavations with topsoil Rehabilitation (topsoil cover, ripping and vegetation establishment)	Establishment of Alien Invasive Species	Moderate Negative	Minor Negative
	Noise Generation	Negligible Negative	Negligible Negative

## Conclusions and Recommendations

The impacts identified are expected to be confined to the specific site and the significance of such impacts is greatly reduced with the implementation of mitigation and management measures. The key mitigation and management measures include:

- Only clear vegetation and remove topsoil when and where necessary;
- Plant species such as *Boophone disticha*, must be removed as per provincial authorisation and transplanted;
- Berms must be constructed around the periphery of the mining site to separate clean and dirty water. Water within the mining site must be diverted to a water sump;
- Site clearing and mining activities to take place during daylight hours only;
- Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided;
- Undertake an alien invasive monitoring programme; and
- Chance Finds Procedures (CFPs) must be developed and clearly describe the reporting process and appropriate management of the exposure of previously unidentified heritage resources.

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## LIST OF APPENDICES

Appendix A: Project Locality Plans

Appendix B: Details of the EAP

Appendix C: PPP Documents

Appendix D: Heritage Report

## LIST OF ACRONYMS

Abbreviation	Explanation
AWS	Automatic Weather Station
BAR	Basic Assessment Report
bgl	below ground level
BIL	Background Information Letter
CBA	Critical Biodiversity Area
Copper Sunset	Copper Sunset Sand (Pty) Ltd
CRR	Comments and Response Report
dBA	decibel
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme Report
ESA	Early Stone Age
FDDM	Fezile Dabi District Municipality
FEL	Front End Loader
GDARD	Gauteng Department of Agriculture and Rural Development
GDP	Gross Domestic Product
GDP-R	Gross Domestic Product per Region
GG	Government Gazette
GN	General Notice
GPS	Global Positioning System
ha	hectare
HIA	Heritage Impact Assessment
I&AP	Interested and Affected Party
IBA	Important Bird Area



<b>Abbreviation</b>	<b>Explanation</b>
IDP	Integrated Development Plan
km	kilometre
km <sup>2</sup>	square kilometre
LDV	Light Duty Vehicles
LED	Local Economic Development
LoM	Life of Mine
LSA	Late Stone Age
m	metre
MAE	Mean Annual Evaporation
MAP	Mean Annual Precipitation
MAR	Mean Annual Runoff
mm	millimetres
MLM	Metsimaholo Local Municipality
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
MRA	Mining Right Application
MSA	Middle Stone Age
MWP	Mining Work Programme
NAAQS	National Ambient Air Quality Standards
NDCR	National Dust Control Regulations
NEM:AQA	National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NEM:WA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NPAES	National Protected Areas Expansion Strategy
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PPP	Public Participation Process
RE	Remaining Extent
SAHRA	South African Heritage Resources Agency
WULA	Water Use Licence Application

Basic Assessment Report and Environmental Management Programme

Environmental Authorisation for the Mining Right Application for a Portion of the farm  
Rietfontein **No. 152**

COP3706



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## **Part A: Scope of Assessment and Basic Assessment Report**



## 1 Introduction

Copper Sunset Sand (Pty) Ltd (hereafter Copper Sunset) is the holder of an approved Environmental Management Programme (EMPr) and Mining Right (Reference: FS 30/5/1/2/2/164 MR) to mine sand on the Bankfontein Farm, Free State Province. In 2015, Copper Sunset applied to extend its Mining Right to incorporate a portion of the remaining extent of the Farm Zandfontein No. 259; a portion of the remaining extent of the Farm Bankfontein No. 9; and a portion of the Farm Rietfontein No. 152 which are all adjacent farms to its existing Mining Right (Appendix A, Plan 1 – Regional Setting, Plan 2 – Local Setting and Plan 3 – Application Area and Mining Right Area). This application has since been approved, under Environmental Authorisation Reference Number: FS 30/5/1/2/3/2/1 (164) EM. Copper Sunset now wishes to extend the expanded Mining Right area to incorporate an additional portion of the farm Rietfontein No. 152 which will further extend its Life of Mine. This extended area is hereafter referred to as “the Mining Right extension”.

The portion of the farm Rietfontein is currently a part of the New Vaal Colliery, owned and operated by Anglo Operations (Pty) Limited (Anglo); an agreement is in place with Anglo for the lease and mining of the abovementioned farm portion. The current Copper Sunset reserve on the farm Bankfontein has reached the end of its Life of Mine (LOM) in 2015 and Copper Sunset has commenced on the approved extension which include portions of the remaining extent of the farms Bankfontein No. 9, Zandfontein No. 259 and a portion of the farm Rietfontein No. 152. To further extend the LOM by 9 months, Copper Sunset intends to then mine on an additional portion of Rietfontein 152.

The Mining Right extension is for a total area of 19.9 ha for the mining of sand. There will be no infrastructure on the Mining Right extension. The extended mine will continue to operate from the existing mining infrastructure. The Mining Right extension is adjacent to Copper Sunset’s current operation, therefore the presence of the sand deposit is well known. The deposit is known to be an average depth of 2.7 m, yielding a total resource over the Mining Right extension of approximately 900 000 cubic metres from all extended areas. The extension application of a portion of the farm Rietfontein will provide Copper Sunset with an additional 9 months on their mining operation.

## 2 Project Applicant

Copper Sunset is applying for consent to amend its Mining Right in accordance with Section 102 of the Mineral and Petroleum Resources Development Act, 2002 (Act No.28 of 2002) (MPRDA). In support of this submission, application is also being made for Environmental Authorisation, for which purpose this Basic Assessment Report (BAR) has been compiled. Please see applicant’s details in Table 2-1.



**Table 2-1: Applicants Details**

<b>Company name:</b>	Copper Sunset Sand (Pty) Ltd
<b>Contact person:</b>	Rudi Wolter
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<b>Telephone:</b>	+27 117879274
<b>Cell phone:</b>	+27 834557496
<b>Email:</b>	<a href="mailto:rudiw@mweb.co.za">rudiw@mweb.co.za</a>

## 2.1 Details of Environmental Assessment Practitioner

Digby Wells has been appointed by Copper Sunset as the independent EAP to conduct the Basic Assessment according to the NEMA, as well as the required Public Participation Process (PPP). Digby Wells is a South African company with international expertise in delivering comprehensive environmental and social solutions, with specific focus on the mining and energy industries. The particulars of the EAP undertaking the EIA process are supplied in Table 2-2.

**Table 2-2: Contact details of the Environmental Assessment Practitioner**

<b>Name of Practitioner:</b>	Duncan Pettit
<b>Telephone:</b>	+27 11 789 9495
<b>Fax:</b>	+27 11 789 9498
<b>Email:</b>	<a href="mailto:duncan.pettit@digbywells.com">duncan.pettit@digbywells.com</a>

## 2.2 Expertise of the EAP

### 2.2.1 The qualifications of the EAP

Duncan Pettit is a Unit Manager for the Environmental and Legal Services Department at Digby Wells. He obtained a Bachelor of Science (B.Sc.) degree in Environmental Management: Zoology Stream from the University of South Africa. Please refer to Appendix B for further details regarding Duncan Pettit's qualification.

### 2.2.2 Summary of the EAP's past experience

Duncan joined Digby Wells Environmental in May 2013 as part of the Environmental Management Services Department. Duncan is responsible for the compilation of Environmental Impact Assessments (EIA), Environmental Management Plans (EMP) and Performance Assessments for Waste Management Licences and Prospecting Rights, among others, as required by South African Legislation. Please find Duncan's CV attached as Appendix B.

### 3 Location of the overall activity

The farm portion of Rietfontein 152 is located in the Fezile Dabi District Municipality of the Free State Province, with the closest towns of Vereeniging and Sasolburg being located approximately 11 km north and 13 km south west, respectively (Appendix A, Plan 1 – Regional Setting). The site specific project area is located 4.2 km to the south of the Vaal River. The general study area (including outside the borders of the study site) includes extensive farmland and mining, with associated houses and buildings (Appendix A, Plan 2 – Local Setting). In addition, a portion of a NFEPA wetland lies within the study site as well as a wetland in proximity south west of the study site. The R716 road lies between this wetland and the study site. The farm portion Copper Sunset intends to incorporate into its Mining Right is a part of the New Vaal Colliery owned and operated by Anglo (Appendix A, Plan 3 – Extension Application Area and Mining Right Area).

The farm associated with the proposed mining activities is detailed in Table 3-1.

**Table 3-1: Description of the directly affected farm portions**

<b>Farm Name:</b>	A portion of the Farm Rietfontein No. 152.
<b>Application Area (Ha):</b>	19.9 ha
<b>Magisterial District:</b>	Free State Province
<b>Distance and direction from nearest town:</b>	Vereeniging is located approximately 11 km to the north; and Sasolburg is located approximately 13 km south west of the study site.
<b>21 digit Surveyor General Code for each farm portion:</b>	Farm Rietfontein No. 152 (F01600000000015200000).

A Land Tenure Map has been attached as Plan 4 in Appendix A.



## 4 Locality map

The regional and local setting of the project is displayed in Plan 1 and Plan 2 in Appendix A.

Plan 3 in Appendix A indicates the project site in relation to Copper Sunset's existing Mining Right area.

## 5 Description of the scope of the proposed overall activity

Copper Sunset's current sand mining operation is located on the Bankfontein farm in the Free State Province and the mining infrastructure already present on this mine will be used for the expanded area. Accordingly, no new infrastructure will be constructed in the expanded application area. The sand deposit begins between 0.35 – 0.5 m below the surface and is 2.5 to 3 m in depth. Strip mining will be utilised to recover the resource, with the sand mined in strips of 30 – 35 m in width. The length of the strips is dependent on the area to be mined but approximate lengths are in the region of 180 – 600 m. The sand is removed and transported to the current mining operations at Bankfontein 9. As each strip is excavated, the stockpiled topsoil is placed in the mined strip as part of the concurrent rehabilitation process. Levelling and contouring of the backfilled excavation is carried out and the topsoil is revegetated; an overall lowering of the topography is experienced. Once an excavation has been rehabilitated the next strip will be mined. The mining method to be applied includes:

- Stripping and stockpiling of topsoil for the strip to be mined and the adjacent access road;
- Establishment of a temporary access road alongside the strip to be mined;
- Mining of the sand resource;
- Backfilling of the mined excavations with the stockpiled topsoil; and
- Concurrent rehabilitation.

### 5.1 Listed and specified activities

The listed activities applicable to the proposed mining activities, as defined by the EIA Regulations, 2014, are outlined in Table 5-1.

**Table 5-1: Listed and specified activities for the project**

Name of Activity	Aerial extent of the activity	Listed Activity	Applicable Listing Notice
Site clearance and vegetation removal	19.9 ha	X – Activity 27	GNR 983



Name of Activity	Aerial extent of the activity	Listed Activity	Applicable Listing Notice
Establishment of access roads / tracks	Alongside of the mine strip	Not Listed <sup>3</sup> Access roads will be less than 8 m wide	Not Listed
Topsoil stockpiling	Piled along the 600 m mine strip	Not Listed	Not Listed
Mining of the sand resources	19.9 ha	Not Applicable (Activity 17 of GN R984 not applicable: existing mining right applies)	N/A
Backfilling of the mined excavations topsoil	19.9 ha	Not Listed	Not Listed
Rehabilitation (topsoil contouring, ripping and vegetation establishment)	19.9 ha	Not Listed	Not Listed

## 5.2 Description of the activities to be undertaken

### 5.2.1 Resource Deposit

Copper Sunset intends to continue mining general sand which consist 90% plaster and 10% building sand. The farm to be incorporated lies adjacent to the existing Copper Sunset mining operations as well as the Anglo Operations training centre and coal stockpiles.

The current mining rate for Copper Sunset is about 65 000 m<sup>3</sup> of all general sand per month and this is expected to continue with the addition of the Mining Right extension resulting in an additional 9 months of production based on the resource available in the Mining Right extension.

### 5.2.2 Mining Method

The mining method will be strip mining due to the shallow depth of the deposit and dozers and trucks will be used to mine the sand. The sand will be mined in strips of 30 – 35 m in width and 2.5 – 3 m in depth.

<sup>3</sup> Copper Sunset will make use of an existing road that is not in use to access the proposed site from the current mining operation. Access roads/tracks will be determined based on the mining strip locations using the shortest route possible. These access routes will be less than 8 m in width and therefore do not trigger Activity 24 GNR 983.



### 5.2.3 Establishment Phase

During the establishment phase of the proposed project, the activities below are foreseen to be undertaken:

- Site Clearance (In strips of 30 – 35 m by 100 to 600 m with a cumulative clearance of less than 20 ha): Vegetation and topsoil, up to 350 mm in depth, will be removed with a bulldozer and stockpiled along the mined out strip; and
- Development of access roads: Copper Sunset will make use of an existing road to the east of the Mining Right extension area that extends from its existing property and is currently not utilised. Access routes / tracks will be created from this existing road to the mined strip; the length and width of these tracks will be less than 5 m. The length will be dependent on the area to be mined but approximate lengths are in the region of 180 – 600 m.

### 5.2.4 Operations Phase

The operation will make use of a fleet of bulldozer, wheel loaders, excavators, graders, articulated trucks, tipper trucks and a tractor loader backhoe. Raw sand will be screened in the existing screening plant to remove impurities. The processing of sand is a component in the current Mining Right held by Copper Sunset. The mined sand will be transported in trucks away from the Mining Right extension to the current mining right area which contains the infrastructure to screen the resource.

Concurrent rehabilitation will be undertaken on the mined out strips or excavations. The mined out strips will be contoured and the stockpiled topsoil applied and levelled to resemble the pre-mining landscape. Although the site will be contoured and levelled to resemble the pre-mining landscape, there will be an overall lowering of the topography. Rehabilitation will ensure the site is free-draining however.

No waste material will be generated on site as the coarse or oversized screened material will be sold as additional building products to the plastering sand. The clean sand will be conveyed to an off take stockpile from where it will be loaded on trucks and delivered to the construction industry.

The operation employs 24 skilled and multi-skilled personnel and this number is not expected to change with the addition of the Mining Right extension. Domestic waste is currently transported and dumped at the Sasolburg Municipality dumping site with permission to do so by the local municipality. All used oil is stored in plastic drums in a concrete bunded area and is collected by Nora Oil Recycling (Pty) Ltd on a monthly basis.

Water will be supplied via a borehole, located on the current mining operation area. This borehole is authorised under a current Water Use Licence (WUL) granted to Copper Sunset. It is anticipated that water will only be required for dust suppression on the expansion area.



### **5.2.5 Rehabilitation**

Concurrent rehabilitation will be undertaken, as and when the mined out strips are completed they will be rehabilitated concurrently to the new mining area.

Rehabilitation will consist of the excavations being filled with the stockpiled topsoil and the area will be contoured and levelled to resemble the original landscape and to ensure the site is free draining; although a lowering of the topsoil will be experienced. Spreading of the stockpiled topsoil will be followed by the revegetation of the area with indigenous seed mix.

## 6 Policy and Legislative Context

From an environmental and social perspective, the proposed project is required to comply with all the obligations in terms of the provisions of the NEMA and MPRDA. The legislative guidelines directing the project are outlined in further detail in Table 6-1.

**Table 6-1: Legislation and guidelines applicable to the project**

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
<p><b><u>Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)</u></b></p> <p>Section 24 of the Constitution provides that everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that –</p> <ul style="list-style-type: none"> <li>i. Prevent pollution and ecological degradation;</li> <li>ii. Promote conservation; and</li> <li>iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</li> </ul>	<p>The implementation of the mitigation and management measures to minimise and prevent negative impacts associated with the project, while promoting justifiable socio-economic development, have been included in Part B, Section 4.</p>	<p>The environmental management objectives of the project will be to protect ecologically sensitive areas and to support sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development.</p>
<p><b><u>Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)</u></b></p> <p>In terms of the provisions of Section 102 of the MPRDA, in respect of the proposed amendments to the existing mining right. The applicant must submit an EMP to the DMR and consult with Interested &amp; Affected Parties (I&amp;APs) for comment regarding the Project.</p>	<p>In terms of Section 16 (3)(b) of the EIA Regulation (2014), any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority. This Report has been compiled as per the</p>	<p>This Basic Assessment Report has been compiled in accordance with the requirements of the NEMA EIA Regulations, 2014, with the environmental management objective to protect ecologically sensitive areas.</p>

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
	requirements of the DMR.	
<p><b><u>National Environmental Management Act, 1998 (Act No. 107 of 1998)</u></b></p> <p>The National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA), as amended, was set in place in accordance with section 24 of the Constitution of the Republic of South Africa. Certain environmental principles under NEMA have to be adhered to, to inform decision making for issues affecting the environment. Section 24 (1)(a) and (b) of NEMA state that:</p> <p><i>The potential impact on the environment and socio-economic conditions of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity.</i></p> <p>The Environmental Impact Assessment (EIA) Regulations, Government Notice Regulation (GN) R.982 were published on 04 December 2014 and promulgated on 08 December 2014. Together with the EIA Regulations, the Minister also published GN R.983 (Listing Notice No. 1), GN R.984 (Listing Notice No. 2) and GN R.985 (Listing Notice No. 3) in terms of sections 24(2) and 24D of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended.</p>	<p>Environmental authorisation is required for listed activities in terms of the EIA Regulations (2014 of the NEMA. The Listed Activities are set out in Section 5.1.</p>	<p>This Basic Assessment Report has been compiled in accordance with the requirements of the NEMA EIA Regulations (2014).</p>





Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
<p><b><u>National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA)</u></b></p> <p>The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) is the overarching legislation that protects and regulates the management of heritage resources in South Africa. The Act requires that Heritage Resources Agency's in this case the South African Heritage Resources Agency (SAHRA) and Provincial Heritage Resources Authority (PHRA), be notified as early as possible of any developments that may exceed certain minimum thresholds.</p>	<p>A Notification of Intent to Develop (NID) has been compiled and will be submitted to the SAHRA and PHRA. The heritage baseline is provided in Section 11.1.12</p>	<p>An NID has been undertaken in support of an approval in terms of the NHRA. The NID will be attached to the Final Basic Assessment as an Appendix.</p>
<p><b><u>National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM:AQA)</u></b></p> <p>According to the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM: AQA) the Department of Environmental Affairs (DEA), the provincial environmental departments and local authorities (district and local municipalities) are separately and jointly responsible for the implementation and enforcement of various aspects of NEM: AQA. A fundamental aspect of the new approach to the air quality regulation, as reflected in the NEM: AQA is the establishment of National Ambient Air Quality Standards (NAAQS). These standards provide the goals for air quality management plans and also provide the benchmark by which the effectiveness of these management plans is measured.</p>	<p>Mitigation measures have been included for the potential impacts on air quality. The mitigation measures will be in compliance with the NEM:AQA, as referred to in Part B, Section 8.</p>	<p>The mitigation and management measures to be implemented as part of the project aim to manage and prevent potential impacts to air quality.</p>
<p><b><u>National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA)</u></b></p>	<p>Mitigation measures have been included for the potential impacts on flora and fauna and the biodiversity</p>	<p>The mitigation and management measures to be implemented as part of the project aim to manage and conserve</p>

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
<p>The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM: BA) regulates the management and conservation of the biodiversity of South Africa within the framework provided under NEMA. This Act also regulates the protection of species and ecosystems that require national protection and also takes into account the management of alien and invasive species. This Act works in accordance to the framework set under NEMA. The following regulations which have been promulgated in terms of the NEM:BA are also of relevance:</p> <ul style="list-style-type: none"> <li>▪ Alien and Invasive Species Lists, 2014 published (GN R.599 in GG 37886 of 1 August 2014) ;</li> <li>▪ National Environmental Management: Biodiversity Act, 2004: Threatened and Protected Species Regulations; and</li> <li>▪ National list of Ecosystems Threatened and in need of Protection under Section 52(1) (a) of the Biodiversity Act (GG 34809, GN R.1002, 9 December 2011).</li> </ul>	<p>of the project site. The mitigation measures will be in compliance with the NEM: BA, as referred to in Part B, Section 8.</p>	<p>biological diversity, as well as to minimise alien invasive species.</p>
<p><b><u>Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA)</u></b></p> <p>CARA aims to provide for the conservation of the natural agricultural resources of the country through the maintenance of the production potential of land, by combatting and preventing erosion and the weakening of water sources. In addition, this Act aims to protect</p>	<p>Mitigation measures have been included for the potential impacts on soils and land capability. The mitigation measures will be in compliance with the CARA, as referred to in Part B, Section 8.</p>	<p>Section 12 of the CARA details the maintenance of soil conservation in which every land user will be responsible for the maintenance and conservation of soil. The mitigation measures recommended as part of this Basic Assessment Report aim to prevent the compaction, erosion</p>

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
vegetation, while combatting weeds and invader plants		and degradation of the soil resources.
<p><b><u>Environmental Conservation Act, 1989 (Act No. 73 of 1989) (ECA)</u></b>                      ECA makes provision for guidelines pertaining to noise control and measurements. The regulations make reference to the use of the South African National Standards 10103:2008 (SANS) guidelines for the Measurement and Rating of Environmental Noise with Respect to Land Use, Health, and Annoyance and to Speech Communication.</p>	<p>Mitigation measures have been included for the potential impacts due to the generation of noise. The mitigation measures will be in compliance with the ECA, as referred to in Part B, Section 8.</p>	<p>The proposed project will not exceed the SANS 10103: 2008 limits for baseline noise measurements, thus conforming to the requirements of the ECA.</p>
<p><b><u>National Water Act, 1998 (Act No. 36 of 1998) (NWA)</u></b>                      NWA makes provision for water resource management, protection of the quality of water resources and recognising the need for the integrated management of all aspects of water resources to achieve sustainable use of water.</p>	<p>Mitigation measures have been included for the potential impacts of surface water and groundwater contamination.</p>	<p>Copper Sunset will require a Water Use Licence for the extension area. Mitigation and management measures to be implemented as part of the project aim to manage and conserve water quality.</p>
<p><b><u>National Environmental Management: Waste Act, 2008 (Act No.59 of 2008)</u></b>                      NEMWA aims to provide regulation for waste management in order to protect health and the environment, for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.</p>	<p>NEMWA is not applicable to the extension area however mitigation measures will be implemented for any unintended waste that could cause pollution and contamination to the area.</p>	<p>Domestic waste is currently dumped at the Sasolburg Municipality site with permission from the municipality. Used oil is collected by a licensed firm.</p>

## **7 Need and Desirability of the Proposed Activities**

### **7.1 Economic Consideration**

It is recognised that mining is an essential contributor to the economic development of South Africa. According to the Chamber of Mines of South Africa's Integrated Annual Review (2015) the mining sector accounted for 7.7% of South Africa's Gross Domestic Product (GDP) directly, and approximately 17% if direct, indirect and induced effects are included. Copper Sunset is reaching the end of its LOM in 2017 and the Mining Right extension will result in the continued mining of general sand (90% plaster and 10% building sand) that is supplied to the construction industry based in the Free State and Gauteng Provinces as well as the retention of jobs. The Mining Right extension has a total resource of approximately 900 000 m<sup>3</sup> which would extend the LOM for another 9 months, with mining of sand expected to yield 65 000 m<sup>3</sup> per month. The continued mining of sand would result in tax contributions towards the country. The total market in the geographical area of Copper Sunset's existing mine is estimated to be between 200 000 and 220 000 tonnes per month. The market share of the existing operation is about 46% and this is not expected to change as the Mining Right extension comes into operation as this will coincide with the partial depletion of the existing mine resource.

### **7.2 Social Consideration**

The extension of the LOM for Copper Sunset will provide continued employment to the current workforce which improves the socio-economic profile of the region. Copper Sunset currently employs 24 skilled and multi-skilled personnel and this number is expected to remain the same as the extension area is incorporated into Copper Sunset's operations.

### **7.3 Environmental Consideration**

As part of the EIA process that was undertaken in Copper Sunset's existing Mining Right application, a range of specialist studies were conducted which relate to the physical, biological and socio-economic environmental aspects potentially affected by the Project. These studies, along with additional specialist studies for fauna and flora; social baseline; heritage assessment; air quality; noise; closure; visual; as well as the Public Participation Process were conducted as part of the extension of the Mining Right. Based on the results of the baseline environment investigations the Mining Right extension area is found to be of limited sensitivity. The area is classed as degraded grassland which has been left fallow. There are no rivers, streams or dams within or in proximity of the site (the closest river is the Vaal River approximately 4 km east of the site) and no red data species were identified in the area. In addition, the deposit of sand is known to be an average depth of 2.7 m while the regional groundwater table varies between 5 – 22 m below the surface. Therefore, groundwater impacts are highly unlikely.

Mitigation measures were also identified for each of the expected impacts which, if correctly implemented, will reduce most moderate / minor negative impacts to negligible negative significance.

## **8 Motivation for the overall preferred site, activities and technology alternative**

The Mining Right extension is limited in extent (19.9 ha) and is categorised as degraded grassland. The Mining Right extension is surrounded by other mining activities or agriculture. The site is situated in proximity to the Anglo Operations stockyard and community centre (500 m). Copper Sunset already operates adjacent to the Mining Right extension and therefore the site can be easily incorporated into the existing mining area. Sensitive environments and receptors have been identified as part of the baseline description and mitigation measures have been provided for potential nuisance impacts. The mining strips layout will be developed to avoid any powerlines<sup>4</sup>, wetlands or watercourses as well as implementing the stipulated buffer zones. Due to the shallow location of the sand, strip mining is the only possible mining process to remove the material. A lease agreement has been agreed between Copper Sunset and New Vaal Colliery, the landowners for the application area.

## **9 Full description of the process followed to reach the proposed preferred alternatives within the site**

### **9.1 Details of the development footprint alternatives considered**

Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives aid in identifying the most appropriate method of developing the project, taking into account location or site alternatives, activity alternatives, technology alternatives, as well as the no-go alternative. Alternatives also aid in determining the activity with the least environmental impact. Some of the potential alternatives that have been identified to date are provided below.

#### **9.1.1 Location Alternative**

The location of the mining activity is determined by the location of the resource. The mineral bearing potential of the additional area is well known and located adjacent to the deposit currently being mined by Copper Sunset. Due to the proximity of the Mining Right extension to the existing operations, no infrastructure will be constructed as the mined material can be transported to the current mining operations of Copper Sunset from where the sand will be distributed to the local and regional construction clients.

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<sup>4</sup> A buffer zone will be implemented based on an agreement with Eskom.

Copper Sunset will make use of an existing unused road to access the extension area to avoid further potential impacts associated with a road construction. Furthermore, access to the mined out strip will be through access routes which will subsequently be mined, which limits the footprint of land cleared to only the areas that will at some stage be mined.

The mining activities will avoid sensitive environments. A flora and fauna specialist study was undertaken to determine the current species content in the Mining Right extension and has determined that the mining operation will have a limited impact on sensitive species and its habitat.

### 9.1.2 No-go Option

The no-go option would result in the sand resources not being mined. As a result, the sand resource will not be available for the construction industry within the Gauteng and Free State Provinces which are reliant on Copper Sunset. Copper Sunset's current LOM is due to finish approximately September 2017. This Mining Right extension would increase the LOM by a total of 9 months.

The no-go option means that all those negative impacts associated with the project would not occur such as vegetation removal with a potential loss of species and habitat, possible siltation of surface water from dust creation and noise and air quality nuisance impacts.

Conversely, the socio-economic benefits of the project would not be realised. Currently, 24 skilled and multi-skilled personnel are employed by Copper Sunset; should the mining area not be expanded Copper Sunset's mining operations will come to an end by approximately September 2017 and the opportunity for continued employment for a further 9 months will not be realised.

## 10 Details of the Public Participation Process followed

A PPP has been designed to comply with the regulatory requirements set out in Regulation 44 and 45 of the EIA Regulations, 2014 and as required in terms of Chapter 5 of NEMA and the MPRDA but is also designed to provide Interested and Affected Parties (I&APs) with an opportunity to evaluate all aspects of the proposed project.

The PPP enables the project team to incorporate stakeholder comments as far as possible into the proposed Project and provided stakeholders with sufficient opportunity to partake meaningfully in the environmental regulatory process.

The PPP included the following:

- A land tenure map was developed indicating the affected property directly adjacent to the proposed mining sites;
- The existing stakeholder database was updated to include adjacent farm properties, relevant authorities with jurisdiction over the land, other interested groups;
- Land Claims Commissioner consultation was undertaken to confirm whether there are any land claims on the directly affected properties;

- I&APs were notified of the application to amend the Mining Right;
- A Background Information Letter (BIL) was compiled and distributed to stakeholders on the database including a registration and comment form;
- Placement of site notices directly around the proposed project site to notify stakeholders of the opportunity to submit written comments for consideration and inviting them to register as I&APs;
- An advertisement in a local newspaper was placed inviting comments and to register as I&APs;
- The Basic Assessment Report (BAR) will be placed at public places and on the Digby Wells website;
- Telephonic consultation with key stakeholders will be undertaken;
- A Comments And Response Report (CRR) will be compiled with comments raised by I&APs;
- Distribution of a notification letter to stakeholders to inform them that the updated BAR is available for public comment;
- A public participation chapter, including CRR will be compiled and included into the BAR; and
- Notification of the Environmental Authorisation decision will be communicated to I&APs via letter and an advertisement will be placed in one regional newspaper.

The inclusion of the elements mentioned above will be carried out in three phases, these being:

- Announcement Phase (Section 10.1);
- Basic Assessment Phase (Section 10.2); and
- Decision Making Phase (Section 10.4).

## 10.1 Announcement Phase

The project was announced together with availability of the Draft BAR for public comment. The announcement phase included the activities detailed below.

### 10.1.1 Identification of Stakeholders

To ensure a proper representation of stakeholders interested in or affected by the proposed project, the following stakeholder identification methods were used to develop a stakeholder database:

- Conducting Windeed and related desktop searches in and around the project to verify landownership and obtain contact details;
- Responses to be received from newspaper advertisement and site notices;

- Responses on the distribution of the Background Information Letter (BIL); and
- Telephonic consultations with landowners to identify additional I&APs.

Stakeholders for the proposed project are grouped into the following categories:

- **Government:** National, Provincial, District and Local authorities;
- **Landowners:** Directly affected and indirectly affected landowners;
- **Land occupiers:** Directly affected and indirectly affected land occupiers;
- **Communities:** Surrounding communities;
- **Non-Governmental Organisations (NGOs):** Environmental and social organisations;
- **Agriculture:** associations or organisations focussed on agricultural activities; and
- **Business:** small medium enterprises and formal organisations.

A stakeholder database has been compiled which will be updated throughout the environmental regulatory process with new stakeholders (Appendix C). Directly affected and adjacent landowners for the proposed expansion are included in Table 10-1 and Table 10-2 respectively.

**Table 10-1: Directly Affected Landowners**

Farm	Portion	Owner
Rietfontein 152	RE	Anglo Operations Proprietary Limited

**Table 10-2: Adjacent Affected Landowners**

Farm	Portion	Owner
Zandfontein 259	RE	Anglo Operations Proprietary Limited
Bankfontein 9	RE	Anglo Operations Proprietary Limited

### 10.1.2 Public Participation Documentation

The following documents were developed for the announcement of the project:

- **Background Information Letter (BIL):** a BIL which included a project description, information about the required legislation, the competent authorities and details of the appointed EAP. The BIL also included a registration and comment form for stakeholders to use for formal registration as I&APs or to submit comments. Information regarding the availability of the BAR was also provided;



- **Newspaper advertisement:** a newspaper advertisement was placed in one local newspaper (Vaalweekblad). The advert included a brief project description, information about the required legislation, the competent authorities, details of the appointed EAP, registration process for I&APs, and information regarding the availability of the BAR for public comment; and
- **Site notices:** site notices were put up at various places as indicated in Table 10-3. The site notices contained a brief project description, information about the required legislation, the competent authorities and details of the EAP, registration process for I&APs and information regarding the availability of the BAR for public comment.

## 10.2 Land Claims Enquiry

An enquiry to identify if any land claims exist within the proposed project area was submitted to the Department of Rural Development, Free State Land Claims Commission on 19 November 2015. Feedback was received from the Land Claims Commissioner on 25 November, stating that there are no land claims on the proposed properties.

## 10.3 Basic Assessment Phase

This BAR was made available for a public comment period of thirty (30) days from **Friday, 10 June 2016 to Monday, 11 July 2016** at two publically accessible places (Zamdela Local Library, Vereeniging Public Library), and on the Digby Wells website ([www.digbywells.com](http://www.digbywells.com)) under Public Documents.

During the Basic Assessment (BA) phase, engagement with I&APs will take place by means of telephonic consultations and emails to remind stakeholders of the review period and to request comments.

With the lapse of the 30-day public comment period, the BAR will be updated and finalised for submission to the DMR for consideration. The updated BAR will also be placed on the Digby Wells website and I&APs will be informed of its availability by means of a letter.

### 10.3.1 Summary of Public Participation Activities undertaken to date

Table 10-3 provides a summary of the PPP activities undertaken to date, referencing material is included in Appendix C.


**Table 10-3: Public Participation Activities**

Activity	Details	Reference in Report
Identification of stakeholders	Stakeholder database which represent various sectors of society, including directly affected and adjacent landowners, in and around the proposed project area.	Appendix C Stakeholder database
Land Claims Enquiry	An enquiry to identify land claims within the proposed project area was submitted to the Department of Rural Development, Free State, Land Claims Commission on 19 November 2015. Feedback was received from the Land Claims Commissioner on Wednesday, 25 November 2015, stating that there is no existing land claims on the proposed properties directly affected by the proposed expansion.	Appendix C Public Participation Materials
Distribution of BIL announcement letter	A BIL with registration and comment form was emailed and posted to stakeholders on Monday, 6 June 2016.  An SMS was also sent to stakeholders on Monday, 6 June 2016 announcing availability of the Draft BAR.	Appendix C Public Participation Materials
Placing of newspaper advertisement	A newspaper advertisement was placed in the Vaalweekblad on Wednesday, 8 June 2016.	Appendix C Public Participation Materials
Putting up of site notices	Site notices were put up at the proposed project site, local libraries and other public places on Wednesday, 8 June 2016. A site notice placement report and map was developed to indicate the locations of site notices in and around the project area. Prominent public places included: <ul style="list-style-type: none"> <li>▪ Zamdela Local Library; and</li> <li>▪ Vereeniging Public Library; and</li> <li>▪</li> </ul>	Appendix C Public Participation Materials

Activity	Details	Reference in Report
Announcement of Draft Basic Assessment Report	<p>Announcement of availability of the Draft BAR was emailed and posted to stakeholders together with the formal project announcement on Monday, 6 June 2016. Copies of the Draft BAR are available to stakeholders at:</p> <ul style="list-style-type: none"> <li>▪ Zamdela Local Library; and</li> <li>▪ Vereeniging Public Library</li> </ul> <p>(The Draft BAR is also available on the Digby Wells website (<a href="http://www.digbywells.com">www.digbywells.com</a>) under Public Documents.</p> <p><i>(The comment period for the Draft BAR is from <b>Friday, 10 June 2016 to Monday, 11 July 2016</b>)</i></p>	Appendix C Public Participation Materials
Telephonic engagement	Engagement with directly and adjacent landowners will be done by means of telephonic consultations to obtain comments.	Appendix C Comment and Response Report
Obtaining comments from stakeholders	Comments, issues of concern and suggestions received from stakeholders will be captured in the Comment and Response Report (CRR). The CRR will be appended to the updated BAR, which will be submitted to the DMR and simultaneously made available to I&APs.	Appendix C Comment and Response Report
Announcement of Final Basic Assessment Report	The final report will be made available on <a href="http://www.digbywells.com">www.digbywells.com</a> (under Public Documents)	

## 10.4 Decision Making Phase

Once the competent authority has taken a decision regarding the application, all registered I&APs will be notified of the environmental authorisation decision by email, letter or fax and as required by legislation an advert will be placed in Vaalweekblad, a local newspaper.

## 10.5 Summary of issues raised by I&APs

To date, Digby Wells has not received any comments from I&APs. This section will be updated following the public review period.

## 11 The Environmental Attributes Associated with the Alternatives

The environmental baseline studies conducted as part of this BAR include:

- Fauna and Flora;
- Air Quality;
- Heritage;

- Soils;
- Noise; and
- Social.

Baseline information was also obtained from the previous EIA/EMP Reports undertaken for Copper Sunset at their existing mining operation. Please note that individual specialist reports were not produced for this process, and specialist findings were directly incorporated into this BAR (apart from the Heritage Basic Assessment Report (appended as Appendix D), which was also submitted to the South African Heritage Resources Agency (SAHRA)).

## 11.1 Baseline Environment

A summary of the baseline environment is provided in Section 11.1.1 to 11.1.12. Flora, fauna and heritage site visits were conducted by specialists from Digby Wells.

The baseline considered all study areas including:

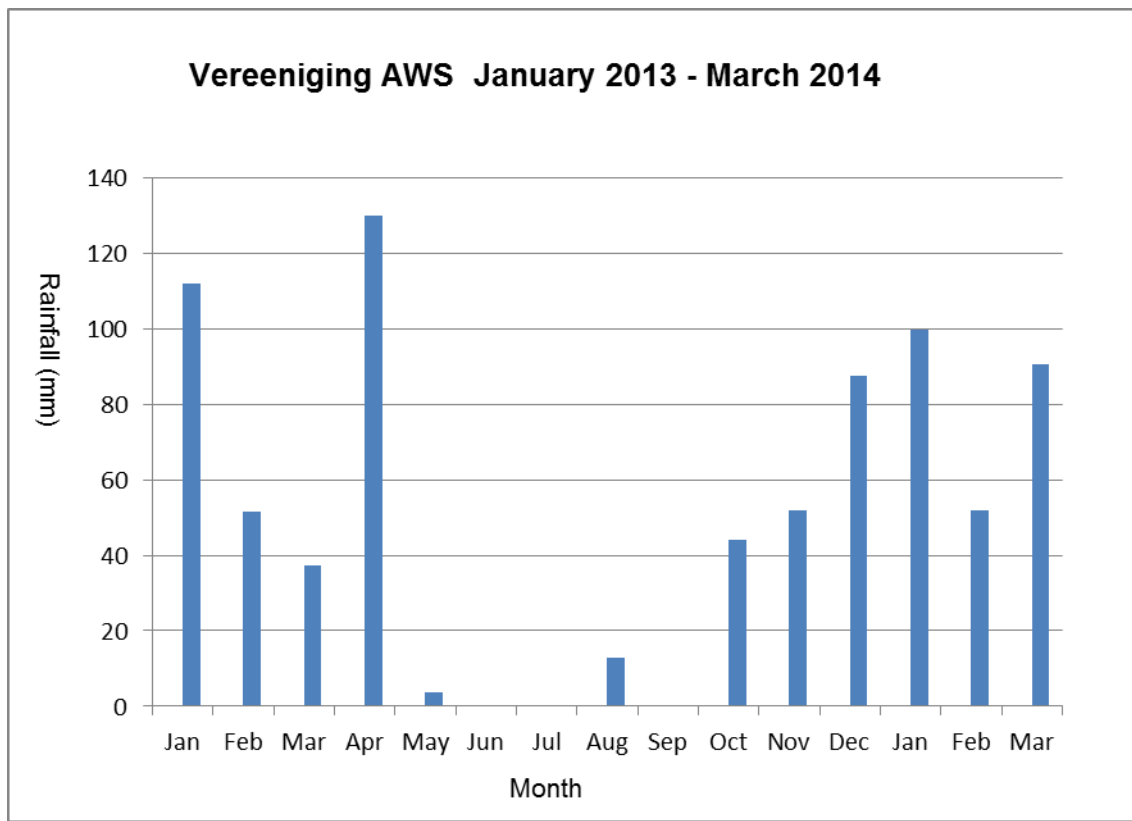
- The **regional study area** - This area was defined as the Fezile Dabi District Municipality (FDDM). Where necessary, the regional study area was extended outside the boundaries of the district municipality;
- The **local study area** – This area was defined as the immediate surrounding properties / farms, as well as the affected Metsimaholo Local Municipality (MLM); and
- The **site-specific study area** – This area was defined as the extent of the farm portions, of the proposed study area including any buffer areas around the study area that may be required.

### 11.1.1 Climate

The project area falls under the Moist Highveld Grassland climatic zone (Kruger, 2004). The region is characterised by cold, dry winters from April to September and warm, wet summers (Schulze *et al.*, 1997). Data from the Automatic Weather Station (AWS) operated by the South African Weather Service was utilised to determine the meteorological conditions in the Project area. The data covers the period January 2013 to March 2014.

#### 11.1.1.1 Rainfall

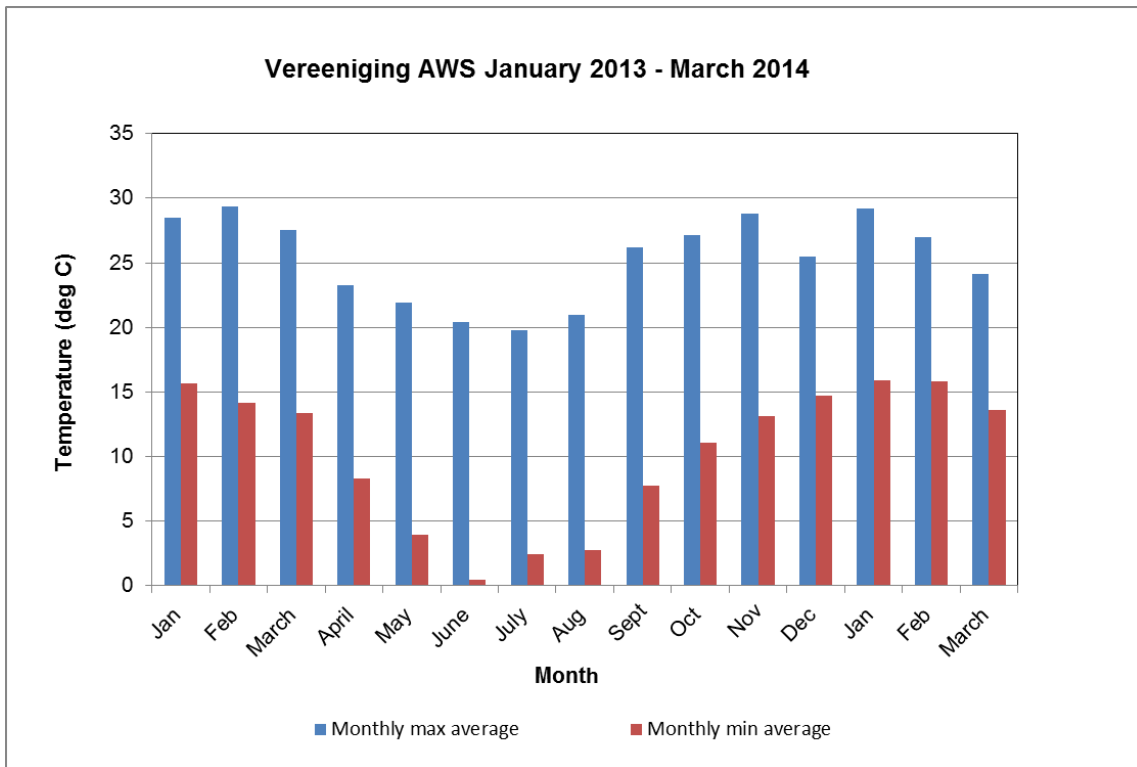
The Mean Annual Precipitation (MAP) for this area is approximately 585 mm with the highest rainfall occurring between October and March. The winter months (June to August) contribute very little (4%) to the annual rainfall for this area. Figure 11-1 shows the rainfall for the project area for the period January 2013 to March 2014 obtained from the Vereeniging AWS. Most rainfall in this area is received from December to April. For the period January 2013 to March 2014, the highest monthly total rainfall of 130 mm was measured in April and no rainfall was measured for the months of June, July and September 2013.



**Figure 11-1: Average Monthly rainfall derived from the Vereeniging AWS Jan 2013 – March 2014**

**11.1.1.2 Temperature**

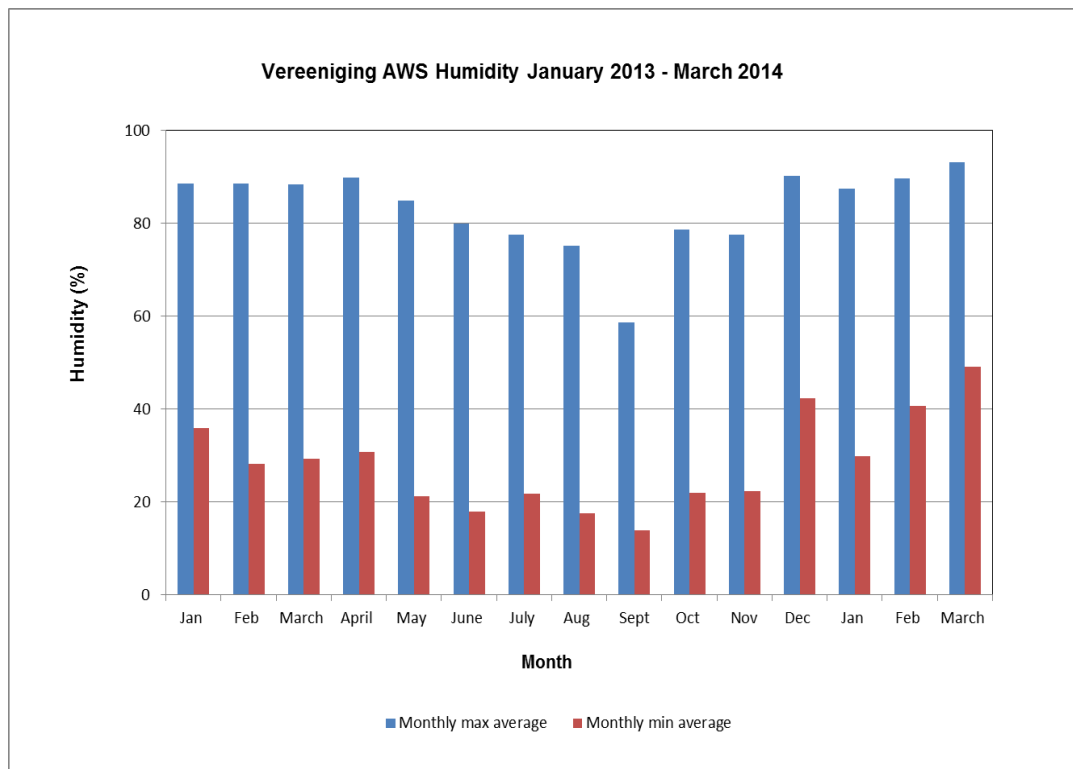
Temperatures for the area are consistent with the Northern Free State climatic zone, with warm summers and cool dry winters. Average temperatures range from 28°C in the summer to lows of -1°C in the winter. The monthly maximum and average temperature plot for the area between January 2013 and March 2014 is depicted in Figure 11-2. The monthly maximum temperature ranges from 29.4°C in February 2013 to 19.8°C in July 2013. The average temperature ranges from 15.9°C in January to 0.5°C in June.



**Figure 11-2: Average monthly temperature derived from the Vereeniging AWS Jan 2013 – March 2014**

**11.1.1.3 Relative Humidity**

Figure 11-3 depicts the relative humidity for the project area from January 2013 to March 2014. The average relative humidity ranges between 48% (March 2014) and 17% (September 2013). The monthly maximums were higher than 70% for the period under survey, except in September (59%).



**Figure 11-3: Average monthly humidity derived from the Vereeniging AWS Jan 2013 – March 2014**

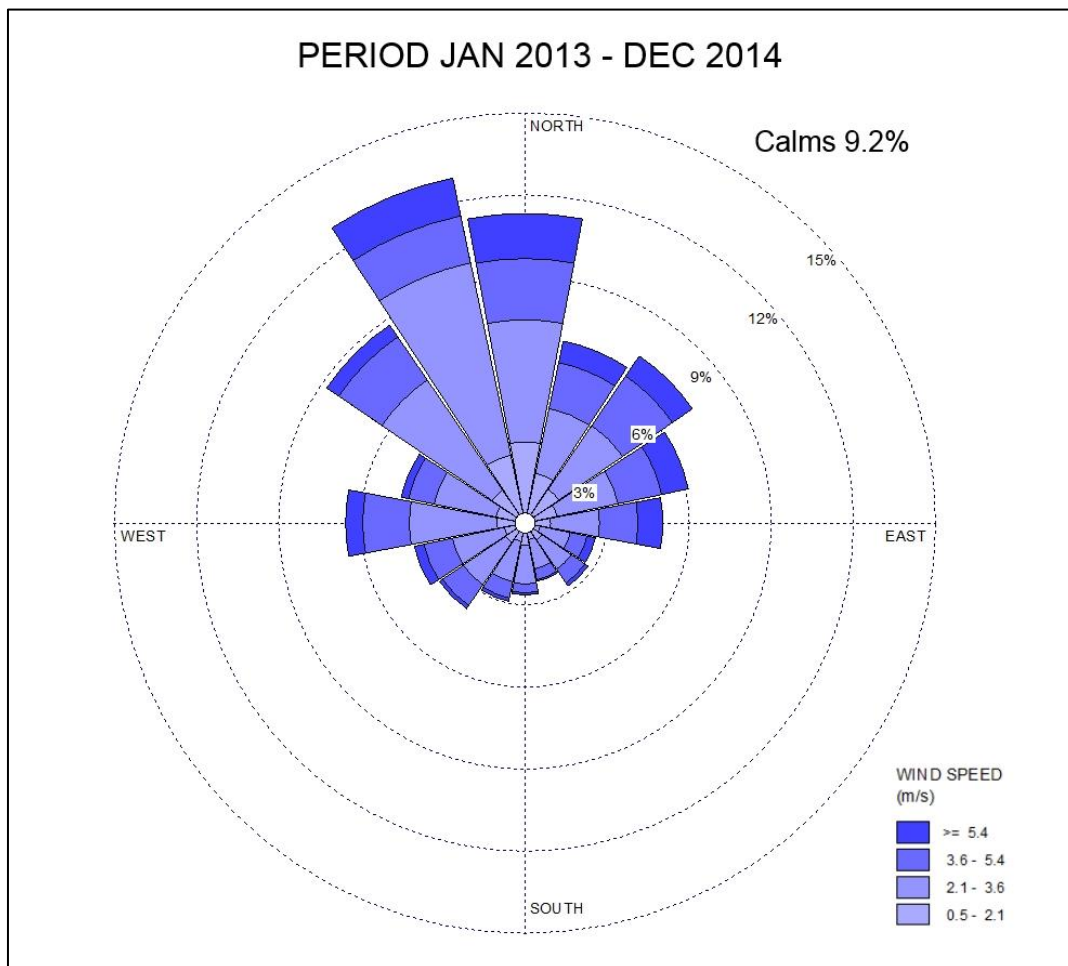
#### **11.1.1.4 Wind Characteristics**

Dispersion of atmospheric pollutants is a function of the prevailing wind characteristics at any site. The wind speed determines both the distance of downward transport and the rate of dilution of pollutants. The generation of mechanical turbulence is similarly a function of the wind speed, in combination with the surface roughness.

The amount of particulate matter generated by wind is highly dependent upon the wind speed. Below the wind speed threshold for a specific particle type, no particulate matter is liberated, while above the threshold, particulate matter liberation tends to increase with the wind speed. The amount of particulate matter generated by wind is also dependent on the material's surface properties. This includes whether the material is crusted, the amount of non-erodible particles and the particle size distribution of the material.

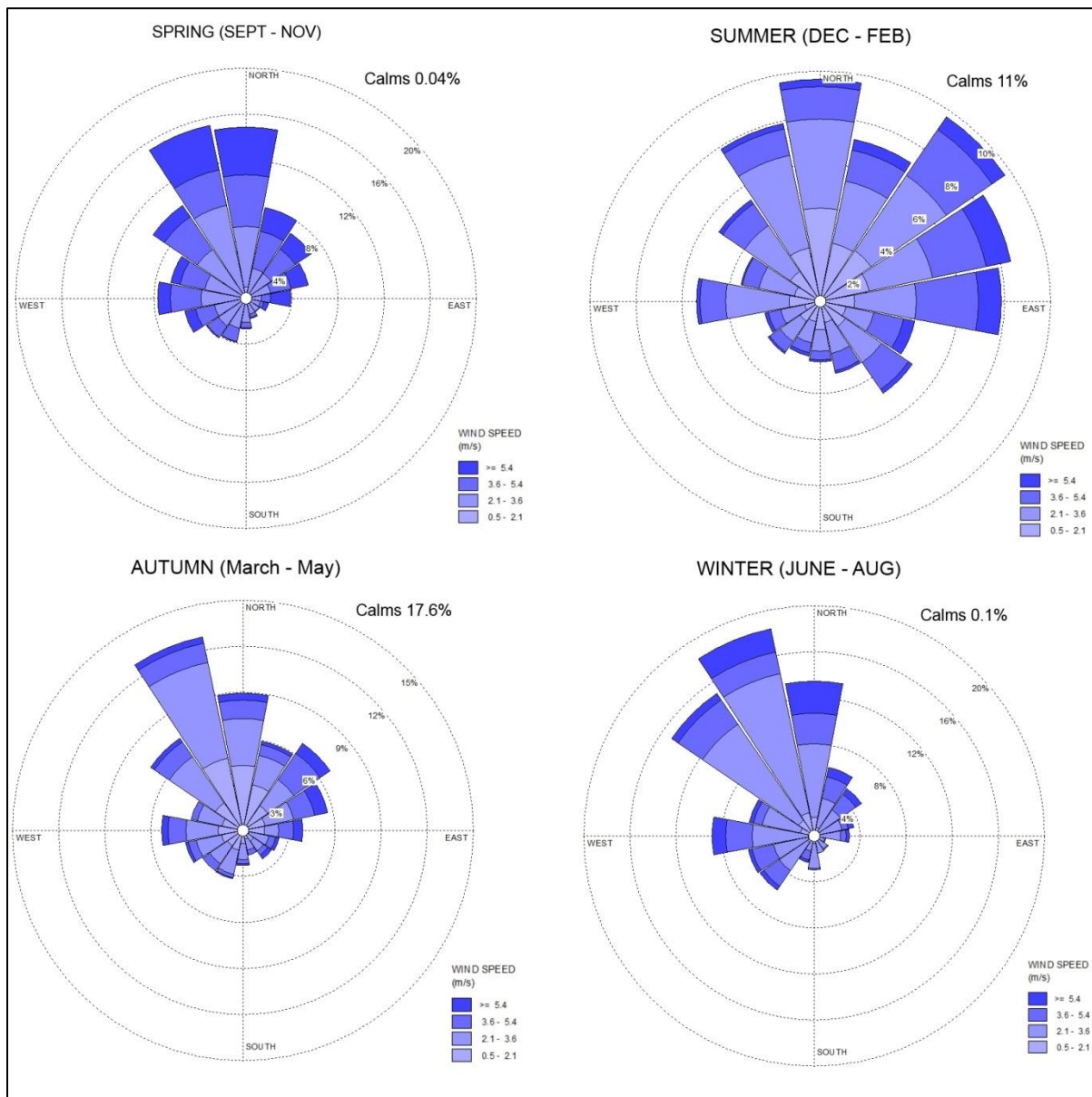
Wind roses comprise 16 spokes which represent the directions from which winds blew during the period. The colours reflect the different categories of wind speeds. The dotted circles provide information regarding the frequency of occurrence of wind speed and direction categories. The figure given at the bottom of the legend describes the frequency with which calms occurred, i.e. periods during which the wind speed was below 0.5 m/s.

Wind roses were developed using data from the Vereeniging AWS. The predominant wind direction is from the north northwest and north, with frequent winds also occurring from the north east and west. Over the assessment period, frequency of occurrence was 12% from the north northwest, 11% from the north and 8% from the northwest sector. Less frequent winds (under 2% of the time) were coming from the south-south east and south. Calm conditions (wind speeds < 0.5 m/s) occurred for 9.2% of the time. Figure 11-5 shows the seasonal variation of the wind directions. The predominant wind direction is similar in spring, winter and autumn. During the summer season (December to February) the predominant wind directions are from the north northwest and north.



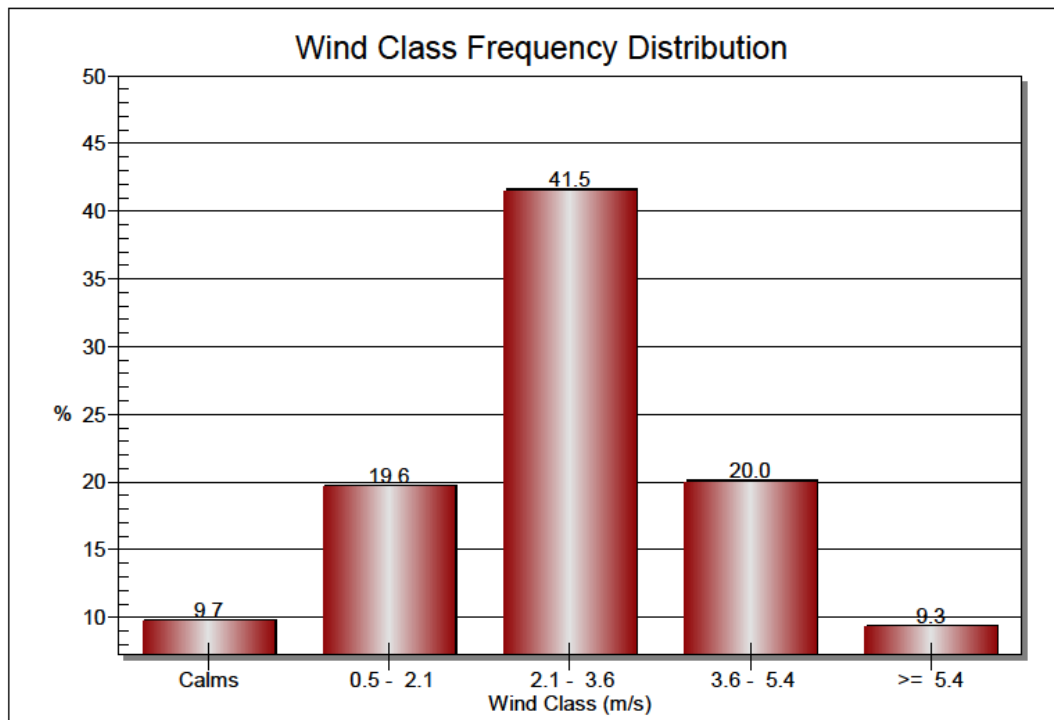
**Figure 11-4: Period surface wind rose from Copper Sunset Mining Area, 01 January 2013 – 31 March 2014**





**Figure 11-5: Seasonal variation of winds in spring (Sept – Nov) (top left); summer (Dec – Feb) (top right); autumn (March – May) (bottom left); and winter (June – August) (bottom right), Vereeniging AWS 01 January 2013 – 31 March 2014**

The wind class frequency for the area indicates that wind speed greater than 5.4 m/s capable of generating dust occurred for approximately 9.3% of the time with calm winds observed for approximately 10% of the time. Much of the winds measured in the area were between 2.1 and 3.6 m/s (Figure 11-6). The predominant classes are set out in Table 11-1.



**Figure 11-6: Wind Class Frequency for the Copper Sunset Mining Area**

**Table 11-1: Wind Direction and Class**

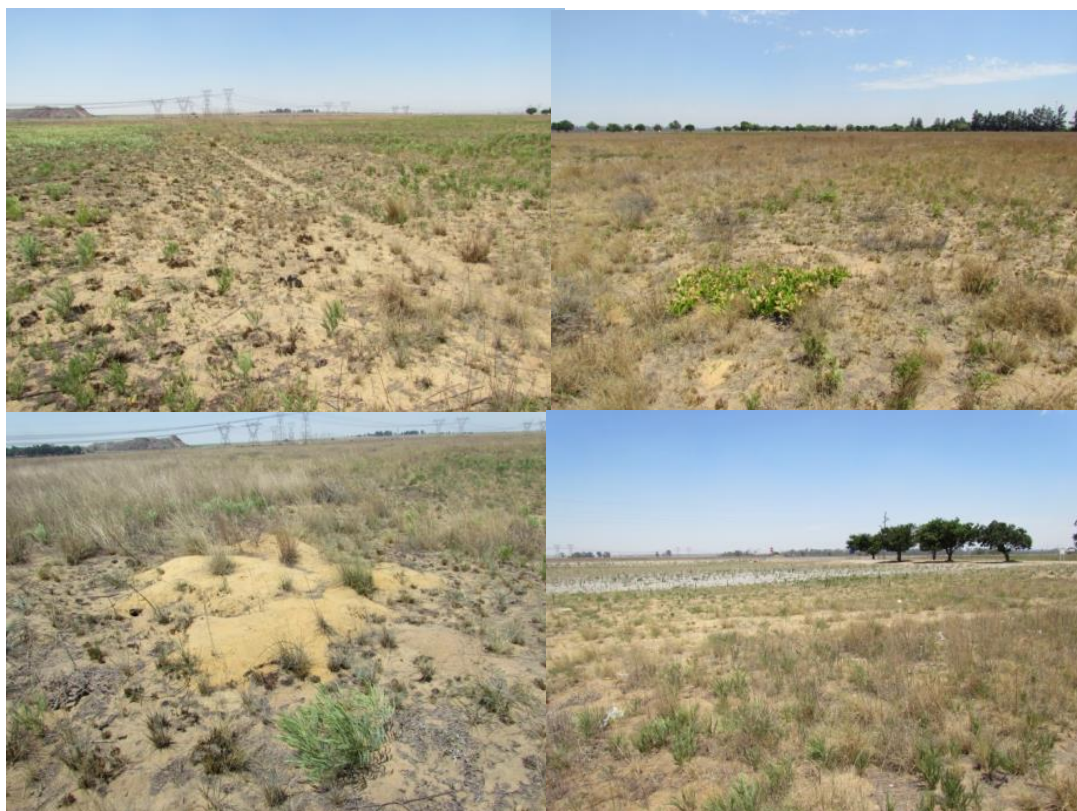
No.	Directions / Wind Classes (m/s)	0.5 - 2.1	2.1 - 3.6	3.6 - 5.4	>= 5.4	Total (%)
1	N	3	4.4	2.2	1.6	10.7
2	NNE	1.9	2.4	1.7	0.8	6.5
3	NE	1.5	2.8	2.2	0.9	7
4	ENE	1.2	2.3	1.6	1	5.8
5	E	0.9	1.8	1.4	0.9	4.8
6	ESE	0.6	1.1	0.6	0.3	2.5
7	SE	0.8	1.3	0.6	0.1	2.6
8	SSE	0.6	1.1	0.4	0.1	2.1
9	S	0.8	1.4	0.3	0.1	2.5
10	SSW	0.7	1.5	0.6	0.1	2.8
11	SW	0.9	1.9	0.9	0.1	3.6
12	WSW	0.8	1.9	1.1	0.4	3.9
13	W	1	3.2	1.7	0.6	6.2
14	WNW	1.1	2.3	1	0.3	4.4
15	NW	1.5	4.9	1.9	0.5	8.3

No.	Directions / Wind Classes (m/s)	0.5 - 2.1	2.1 - 3.6	3.6 - 5.4	>= 5.4	Total (%)
16	NNW	2.5	7.2	1.8	1.4	12.2
	<b>Sub-Total</b>	<b>18.7</b>	<b>39.5</b>	<b>19</b>	<b>8.8</b>	<b>85.9</b>
	Calms					9.2
	Missing/Incomplete					4.9
	<b>Total</b>					<b>100</b>

### 11.1.2 Visual Environment

The study area is characterised by flat topography with no significant topographical features such as hills or ridges, or water courses. Mining and agricultural activities dominate the surrounding area and have impacted the local topography. The main visual receptors include the Anglo New Vaal Colliery’s Community centre is located approximately 500 m south west and Viljoensdrif community approximately 1 km north west of the study area. The R716 road lies between the study site and Viljoensdrif community.

No infrastructure will be constructed at the Mining Right extension area which further reduces the potential visual impacts associated with the expansion of Copper Sunset’s operations.



**Figure 11-7: General view of the current state of the environment (top row), example of orange brown sand and ploughing within the project area (bottom row)**

### 11.1.3 Geology

The Mining Right extension lies within the Vryheid Formation that forms part of the Ecca Group which is part of the Karoo Supergroup. The Vryheid Formation consists predominantly of thick beds of yellowish to white cross-bedded sandstone and grit alternating with beds of soft sandy shale. The geology of the area contains coal seams that support the coal mining activities of the adjacent properties (although all coal in the area of interest has been completely mined out). Dolerite sheets and dykes have intruded the sedimentary rocks extensively in the Formation. Refer to Plan 5 in Appendix A.

### 11.1.4 Soil, Land Capability and Land Use

Existing Land Type data was used to obtain generalised soil patterns and terrain types for the project site. Land Type data exists in the form of published 1:250 000 maps. These maps indicate delineated areas of similar terrain types, pedosystems (uniform terrain and soil pattern) and climate (Land Type Survey Staff, 1989). These maps are general guidelines of what soils can be expected in the area.

The general terrain is flat and the soils are derived from Aeolian sand moved in over local colluvium derived from Ecca sandstone. According to a soils study completed for the previous expansion on the adjacent property, the soils were found to extend further than 1.2 m deep (Jackson, 2014). Groundwater studies completed for the New Vaal Colliery approximately 1 km south of the site specific study area found that the alluvium of fine sand extends 6 m deep (Golder Associates, 2012). The Land Type has been defined as Upland Duplex and/or Margalithic soils (Ca1) (Jackson, 2014).

#### 11.1.4.1 Land Use

The local study area is situated within the Grassland Biome with a relatively flat topography (Mucina & Rutherford, 2006). The natural veld that would mainly consist of *Cymbopogon plurinodis* and *Cynodon dactylon* is greatly altered through old ploughed areas, plantations, illegal dumping and coal mining. The farms currently belong to Anglo Operations and were previously mined for coal. The area is classed as degraded grassland which has been left fallow.

### 11.1.5 Air Quality

#### 11.1.5.1 Study Area

The expanded mining area falls within the Vaal Triangle Airshed Priority Area (VTAPA), which was declared as a priority area and was published in the Government Gazette in terms of Section 18 (1) of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) under Notice No. 365 of 21 April 2006, as amended by Notice 711 of 17 August 2007. VTAPA is the first priority area in South Africa and was declared such due to the concern of elevated pollutant concentrations within the area, specifically particulates.

The Vaal Triangle is a highly industrialised area with numerous industries, coal fired power stations, and various smaller industrial and commercial activities in addition to a number of collieries and quarries. Within the area, there are large informal settlements using coal and woody biomass for cooking and space heating. The area is also home to commercial agricultural activities and a host of other fugitive sources of air pollution, which can have implications on the health and wellbeing of exposed residents in the area. This air quality assessment focuses on dust fallout.

#### **11.1.5.2 Dust Fallout**

A dust monitoring network of four different units in the vicinity of the proposed project was made available for analysis. The site address and coordinates are presented in Table 11-2, while the site locations are depicted in Plan 6 of Appendix A.

**Table 11-2: Dust Fallout Monitoring Point Locations**

Site ID	Latitude	Longitude
Main Gate	S26°45'08.64	E27°56'23.04
Behind Workshop	S26°45'12.77	E27°56'30.29
Haul Road from Quarry	S26°45'06.25	E27°56'35.41
Behind Wash Plant	S26°45'11.45	E27°56'42.19

In terms of dust deposition standards, a four-band scale: residential, industrial, action and alert thresholds and permissible frequency of exceedances described in SANS1929:2011 was applied prior to the release of the National Environmental Management: Air Quality Act, 2004 (Act.39 of 2004) - National Dust Control Regulation (NDCR, 2013).

The Minister of Water and Environmental Affairs released on 01 November 2013 the National Dust Control Regulation, in terms of Section 53, read with Section 32 of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004). In line with NDCR and on the basis of the cumulative South African experience the National Department of Environmental Affairs published the acceptable dust fallout rates in residential and non-residential areas (Table 11-3).

**Table 11-3: Acceptable Dust Fall Rates as Measured (NEMAQA – NDCR, 2013)**

Restriction Areas	Dust fall rate (mg/m <sup>2</sup> /day, 30-days average)	Permitted Frequency of exceeding dust fall rate
Residential Area	D < 600	Two within a year, not sequential months
Non-Residential Area	600 < D < 1200	Two within a year, not sequential months

The dust deposition rates, measured at Copper Sunset’s current mining area, from March 2013 – October 2015 are tabulated and illustrated by means of graphs. These results were then further analysed, compared and interpreted according to SANS 1929:2011 “Ambient air quality – Limits for common pollutants”. These results can then be used as a baseline air quality measurement for the Mining Right extension.

In the graphs (Figure 11-8, Figure 11-9 and Figure 11-10), the blue line represents the limit which the dust fallout levels are permissible for residential and for non-residential, while the red line represents the limit where the dust fallout rate is being exceeded. Once the exceedance happens, an incident report is compiled and submitted to the relevant authority.

Dust deposition data for 2013 (Table 11-4), 2014 (Table 11-5) and 2015 (Table 11-6) are presented. The graphs show a comparison of dust deposition rates to the standards (Figure 11-8, Figure 11-9 and Figure 11-10).

**Table 11-4: Proposed project area dust fallout results for Aug – Dec 2013**

Dust Fallout 30-day average [mg/m <sup>2</sup> /d]				
Exposure Period	At Main Gate	Behind Workshop	Haul Road from Quarry	Behind Wash Plant
Aug 2013	203	201	416	377
Sep 2013	699	121	517	389
Oct 2013	279	253	311	721
Nov 2013	513	563	375	<b>3 855<sup>5</sup></b>
Dec 2013	524	<b>1 489</b>	69	0

<sup>5</sup> The red text indicates exceedance according to SANS 1929:2011 “Ambient air quality – Limits for common pollutants”.

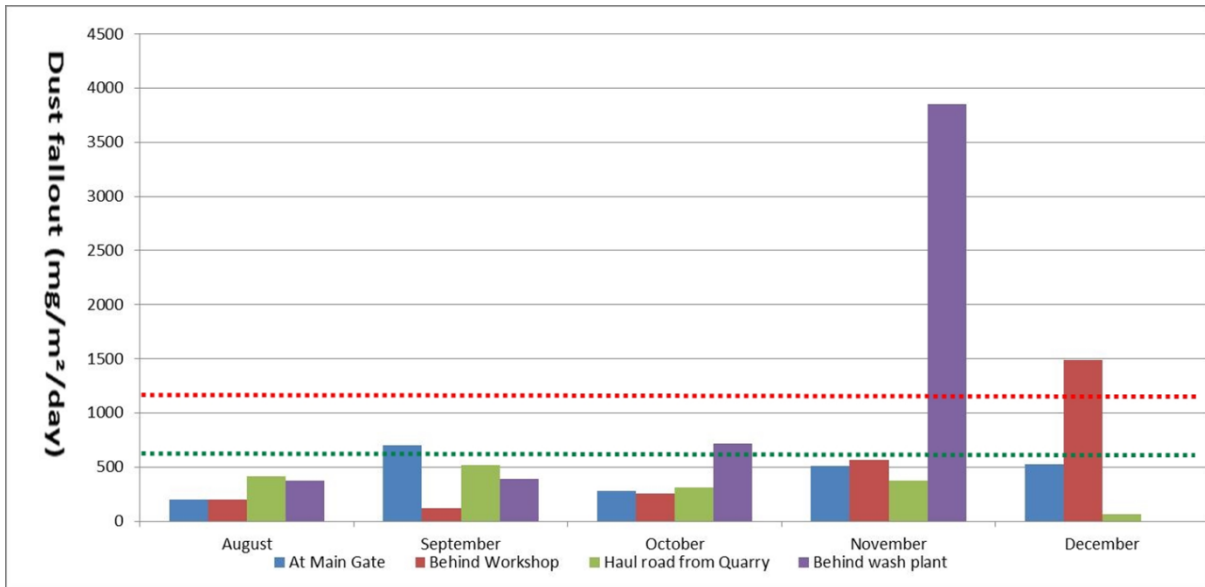
**Table 11-5: Project area dust fallout results for Jan – Dec 2014**

<b>Dust Fallout 30-day average (mg/m<sup>2</sup>/d)</b>				
<b>Exposure Period</b>	<b>At Main Gate</b>	<b>Behind Workshop</b>	<b>Haul Road from Quarry</b>	<b>Behind Wash Plant</b>
Jan 2014	457	288	140	232
Feb 2014	283	272	86	274
Mar 2014	403	188	630	228
April 2014	276	76	451	117
May 2014	259	55	194	50
Jun 2014	329	180	143	149
Jul 2014	712	84	240	210
Aug 2014	0	1342	76	212
Sep 2014	347	0	381	151
Oct 2014	216	251	296	399
Nov 2014	1018	176	226	395
Dec 2014	617	268	764	455

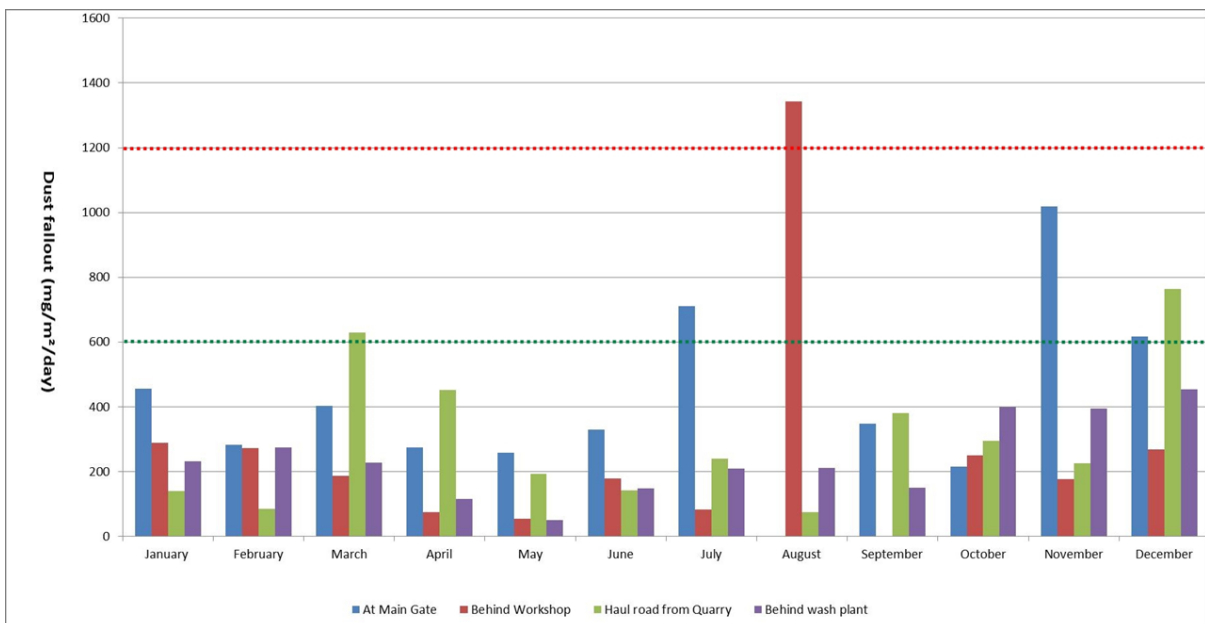
**Table 11-6: Proposed project area dust fallout results for Jan – Oct 2015**

<b>Dust Fallout 30-day average (mg/m<sup>2</sup>/d)</b>				
<b>Site Code</b>	<b>At Main Gate</b>	<b>Behind Workshop</b>	<b>Haul Road from Quarry</b>	<b>Behind Wash Plant</b>
Jan 2015	239	105	80	159
Feb 2015	406	351	0	244
Mar 2015	675	143	840	132
Apr 2015	338	74	241	118
May 2015	445	66	186	78
Jun 2015	236	0	266	228
Jul 2015	363	0	125	41

Aug 2015	297	77	415	432
Sep 2015	218	226	113	190
Oct 2015	239	105	80	159

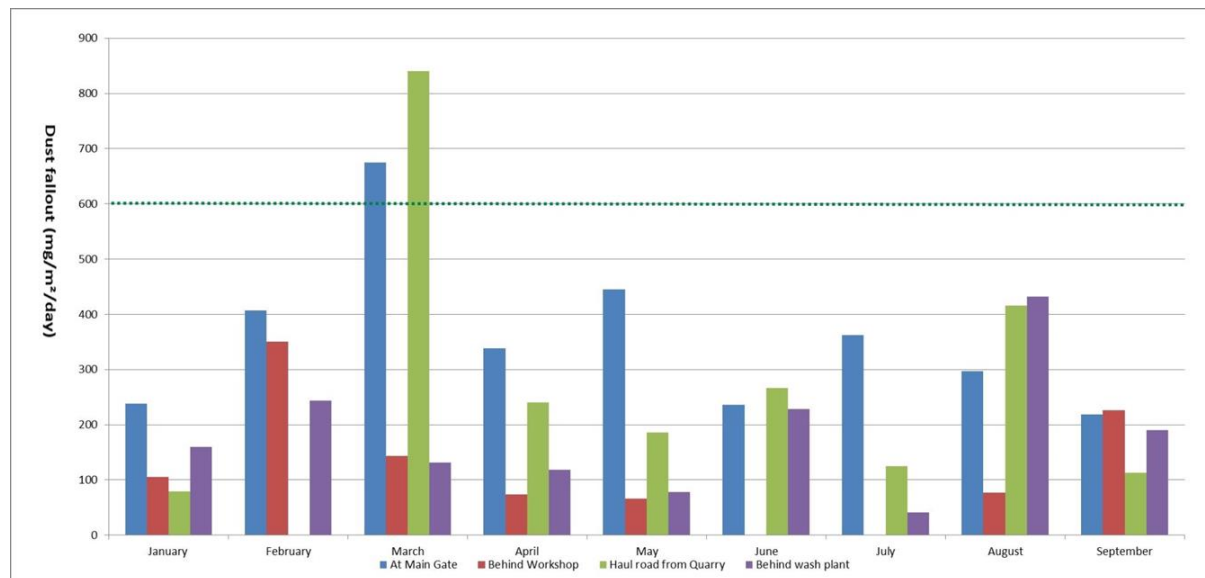


**Figure 11-8: Dust Fallout Data (Aug – Dec 2013)**



**Figure 11-9: Dust Fallout Data (Jan – Dec 2014)**





**Figure 11-10: Dust Fallout Data (Jan – Oct 2015)**

Measured results are presented and compared against the current NDCR 2013 standard. The deposition rates observed confirm that the area is within compliance as rates observed are within the recommended non-residential standards of 1200 mg/m<sup>2</sup>/d for the majority of the sampling window. In 2013, the dust deposition rates exceeded the non-residential limit at the following sites: “Behind the wash plant” (November) and “Haul road from quarry” (December).

In 2014, the site “Behind workshop” exceeded the non-residential limit of 1 200 mg/m<sup>2</sup>/d. The site “Haul road from quarry” exceeded the residential limit in March and December 2014. The site “Main gate” exceeded the residential limit in the following months: July, November and December. The exceedance may be a result of dust generating activities from surrounding mining operations as well as increases in wind speed associated with dry season and low calms.

In 2015, deposition rates at the sites were all within the non-residential limit (1 200 mg/m<sup>2</sup>/d). However, the sites “At main gate” and “Haul road from quarry” recorded deposition rates higher than the residential limit of 600 mg/m<sup>2</sup>/d. The exceedances recorded were not in consecutive months, according to dust fallout standards, permissible exceedance is twice within a year but not in sequential months.

### 11.1.6 Noise

Baseline noise in the project area was measured for the Mining Right extension and interpreted using the Free State noise control regulations as published under PN24 of 1998 (PG 35 of 24 April 1998) in terms of Section 25 of the Environmental Conservation Act, 1989 (Act 73 of 1989) as well as guidelines provided by SANS 10103:2008. According to the SANS 10103:2008 “The measurement and rating of environmental noise with respect to

annoyance and to speech communication”, the sound pressure level is used as the measurement unit for noise levels.

A baseline assessment was undertaken to determine the current ambient noise level at the nearest noise sensitive receptor to the proposed project. The criteria that were used for the siting of the measurement locations are:

- The location of the nearest noise sensitive receptor to the project area and subsequently the most likely to be impacted on by the proposed mining activities; and
- A location that serves as a suitable reference point for the measurement of ambient sound levels surrounding the proposed project area. The noise measurement location (Table 11-7; Plan 6 in Appendix A) covers the community centre of Anglo’s New Vaal Colliery.

A Cirrus, Optimus Green, precision integrating sound level meter was used for the measurements. The instrument was field calibrated with a Cirrus, sound level calibrator. One noise measurement location is deemed suitable, as the closest noise sensitive receptor is the Community Centre, with the surrounding area constituting heavy industry including mining operations.

**Table 11-7: Noise measurement location**

Site ID	Farm/location	Category of receiver	GPS coordinates
N1	Anglo Coal New Vaal Colliery’s Community Centre	Residential	26° 44’31.46’’S & 27° 56’12.73’’E

Predictive modelling was performed for the proposed mining activities through the use of the modelling software SoundPlan. The software specializes in computer simulations of noise pollution dispersion. Estimates of the cumulative mining noise levels from the project area were derived from the noise emissions from all the major noise-generating components and activities in the project area. Noise dispersion modelling software was used to assess whether the noise from the proposed mining activities will impact on the relevant noise sensitive receivers, by comparing the predicted propagating noise levels with the current ambient baseline noise levels (Plan 7, Appendix A).

According to the Free State Noise Control Regulations “disturbing noise” means a noise level that exceeds the ambient sound level measured continuously at the same measuring point by 5 dBA or more.

The results from the noise meter recordings for all the sampled points as well as the rating limits according to the SANS 10103:2008 guidelines are presented in Table 11-8. The noise level time history graph per noise measurement location can be seen in Figure 11-11.

**Table 11-8: Average Noise Levels**

Sample ID	SANS 10103:2008 rating limit					
	Type of district	Period	Acceptable rating level dBA	$L_{Aeq,T}$ dBA	Maximum/Minimum dBA	Date
N1	Suburban	Daytime	50	48	78 / 35	01/10/2012
		Night time	40	52	73 / 46	01/10/2012
	Indicates current $L_{Aeq,T}$ levels above either the daytime rating limit or the night time rating limit					

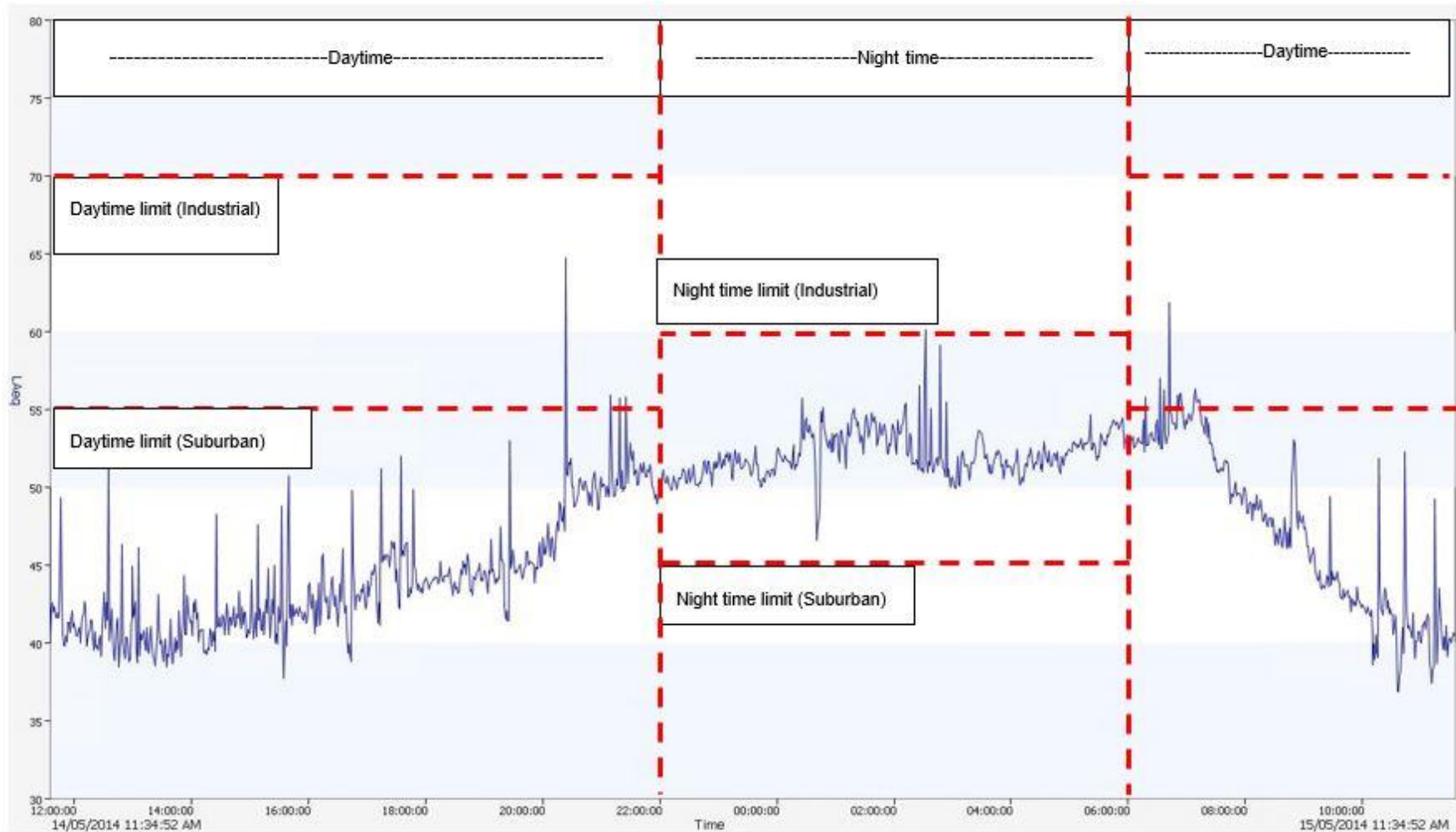


Figure 11-11: Noise time history graph for N1

Based on the daytime results measured at Anglo Coal New Vaal Colliery's Community Centre, the existing ambient noise levels were mostly below the SANS rating levels for the maximum allowable outdoor daytime limit for ambient noise in industrial districts as well as below the daytime limit for ambient noise in suburban districts. The main noise sources contributing to the ambient daytime levels are the sirens and conveyer belts at the coal stockyard as well as the occasional railway noise.

Based on the night time results, the existing ambient noise levels are mostly below the SANS rating levels for the maximum allowable outdoor night time limit for ambient noise in industrial districts but above the night time limit for ambient noise in suburban districts. The main noise sources contributing to the ambient night time levels are the sirens and conveyer belts at the coal stockyard as well as the occasional railway noise.

The noise sources that were audible during the baseline measurement at the time of the noise survey and that were responsible for the day/ night time level are summarised in Table 11-9.

**Table 11-9: Noise sources during baseline measurements**

Noise source description			
Day	Duration	Night	Duration
Sirens and conveyor belts at Anglo Coal's stockyard	Continuous	Sirens and conveyor belts at Anglo Coal's stockyard	Continuous
Railway noise	Intermittent	Railway noise	Intermittent
Avi-faunal noise	Intermittent		

### 11.1.7 Fauna and Flora

Due to current and historic land use, the farms currently belong to Anglo Operations and were previously mined for coal, the study site is seen to consist of degraded grassland, primarily as a result of anthropogenic impacts. The general study area (including outside the borders of the study site) includes extensive farmland and mining, with associated houses and buildings.

As degraded areas contain some indigenous elements, it is important to provide a brief description of these areas. Most degraded sites are areas that may have been partially cleared in the past, resulting in the majority of this vegetation type comprising grass species with scattered shrubs. Degraded areas are thus a grassland habitat with some wetland species in the low lying areas, with high numbers of plants indicating over grazing and few geophyte species. Common species include *Eragrostis gummiflua*, *Digitaria eriantha* and *Eragrostis curvula*. It is important to note that despite the somewhat disturbed nature of the site, the grassland areas form important habitat for species such as rodents and moles, and form process areas that are vital to the functioning of the ecosystem. There are two main

vegetation types (Plan 8, Appendix A) forming the degraded areas, these are grassland type 1 and grassland type 2, which are described in Table 11-10.

**Table 11-10: Vegetation Types found in the Proposed Project Area**

Vegetation type	Description	Dominant and Notable Species
Vegetation type 1	This grassland was found inside the semi-circular mound. In general grasslands tend to be quite degraded throughout the area with low species of diversity and richness and many species commonly associated with impacted areas. Despite this they contain some provincially protected species and it is suspected that more may be found	<i>Eragrostis curvula</i> <i>Themeda triandra</i> <i>Digitaria eriantha</i> <i>Seriphium plumosum</i> <i>Aristida junciformis</i> <i>Sporobolus africanus</i> <i>Panicum schinzii</i> <i>Enneapogon cenchroides</i>
Vegetation type 2	This vegetation unit was found outside of the semi-circular earth mound. In this vegetation type many small areas were encountered where water collects. These areas had a higher clay percentage than the remaining grassland. The remaining areas were sandier with the species composition reflecting this.	<i>Andropogon appendiculatus</i> <i>Aristida congesta congesta</i> <i>Enneapogon cenchroides</i> <i>Melinis repens</i> <i>Imperata cylindrica</i> <i>Themeda triandra</i>

#### 11.1.7.1 Flora

During the flora baseline assessment conducted in November 2015, a total of 43 species were recorded from the study site. Some of the most common species include: *Themeda triandra*, *Eragrostis gummiflua* and *Digitaria eriantha* which occurred in most sample plots. *Poaceae* (the grass family) is well represented with 24 species, accompanied by five (5) reed and sedge species. Certain areas of the site also comprise of problem species (these are discussed in depth below), especially *Seriphium plumosum* (bankrupt bush) which is common in disturbed areas.

There are limited numbers of geophyte species including *Boophone disticha* and *Ledebouria* species. It is believed that there should be higher numbers of such species but due to anthropogenic influences on the area, mainly from previous disturbance from coal mining, the concentration of the existing species has reduced. Some species that occur in the area are presented in Figure 11-12.



**Figure 11-12: Common species of the study area: A) *Imperata cylindrica*, a grass occurring in wet areas; B) *Ledebouria ovatifolia*; C) *Eragrostis gummiflua*; and D) *Eragrostis curvula* both common grass species**

One Species of Special Concern (SSC), a protected plant species was encountered in the study area, *Boophone disticha* or Poison Bulb (Figure 11-13).



**Figure 11-13: *Boophone disticha* leaves**



*Boophone disticha* (declining) (Raimondo et al. (2009) or Poison Bulb: The extremely toxic bulb is used extensively throughout Africa for traditional medicine, and its medicinal uses have been extensively documented. It is very popular in the cultural medicine (muthi) markets and amongst urban and rural healers.

There were 24 grass species encountered. Four increaser<sup>6</sup> and two sub climax grass species were found. This means that a certain degree of disturbance is present in the area, due to the rolling hill effect and possible ‘ponding’ where water accumulates. One decrease<sup>7</sup> species was found, *Digitaria eriantha*, this species can be expected to decrease if the area is under stress, which can explain why many were not encountered.

Sixteen alien invasive or weed species were recorded in the project area. These usually occurred in the transformed areas along roadsides and in disturbed areas such as the edges of fields. Some species occurred in natural vegetation where there was some disturbance. The alien species recorded from site are presented in Table 11-11.

**Table 11-11: List of all Alien Invasive Species recorded at the proposed project site**

Scientific Name	Common Name	Ecological Status	Form
<i>Bidens pilosa</i>	Common Black-jack	Alien Invasive	Herb
<i>Cyperus congestus</i>	Cyperus	Weed	Sedge
<i>Datura stramonium</i>	Common Thorn Apple	Alien Invasive*	Herb
<i>Flaveria bidentis</i>	Smelter's bush	Alien invasive	Shrub
<i>Seriphium plumosum</i>	Bankrupt Bush	Weed	Shrub
<i>Tagetes minuta</i>	Tall Khaki Weed	Alien Invasive	Herb
<i>Verbena aristegera</i>	Fine leaved Verbena	Weed	Herb
<i>Verbena bonariensis</i>	Tall Verbena	Alien invasive	Shrub

Alien invasive species tend to out-compete the indigenous vegetation; this is due to the fact that they are vigorous growers that are adaptable and able to invade a wide range of ecological niches (Bromilow, 2010). They are tough, can withstand unfavourable conditions and are easily dispersed. This is indicative of early stages of succession and although these species are invasive their presence can stabilise the soil and prevent soil erosion from occurring, which protects a valuable resource from being lost. These are also the areas associated with the highest exposure to disturbances, and as mentioned previously, these plants are highly adaptable and do colonise open or disturbed areas, which are prevalent in the above mentioned communities.

<sup>6</sup> Increase in abundance following grazing

<sup>7</sup> Decrease in abundance when exposed to heavy grazing





The presence of exotic invasive and weed plant species in an area is either an indication of recent disturbance where these species are pioneering, re-establishment of plants, or misuse of an area where the natural plant species were selectively or completely removed as a result of overgrazing by livestock.

The presence or absence of these plants in a specific habitat type is therefore an indication of the ecological capacity and importance of that specific habitat type. Areas that contained high numbers of alien invasive and weed species are found not to support high numbers of animals, as these plants are normally unpalatable for animals to eat. This list cannot be considered as complete as many other species can be present within any given season or day of the year.

### ***11.1.7.2 Fauna***

#### ***11.1.7.2.1 Mammals***

In November 2015, a baseline survey for mammals was carried out where actual sightings, spoor, calls, dung and nesting sites were used to establish the presence of animals on the proposed project site. The evidence of dung and spoor suggests that animals were present in the area although very few were recorded during the surveys. The observations of local land owners were used to supplement the findings of the mammal survey. No species were found to be of concern. This list cannot be considered as a complete list as many other mammals can be present within any given season or day of the year.

#### ***11.1.7.2.2 Avifauna***

Birds have been viewed as good ecological indicators, since their presence or absence tends to represent conditions pertaining to the proper functioning of an ecosystem. Bird communities and ecological condition are linked to land cover. As the land cover of an area changes, so do the types of birds in that area (The Bird Community Index, 2007). Land cover is directly linked to habitats within the study area. The diversity of these habitats should give rise to many different species. During the fauna study in November 2015, a total of 24 bird species was identified as occurring in the area of interest. Most of these birds were observed in the vicinity of less disturbed areas. Many were also identified close to the wetland areas, with birds regularly seen feeding on dried maize kernels on the edges of maize fields.

Red Data bird species protected within the Free State Province were also considered during the field survey. The possibility of occurrence was based on the distribution and habitat requirements of these Red Data species. No red data bird species were identified.

During the November 2015 field survey 24 species were observed. Table 11-12 summarises all species of birds recorded. This list cannot be considered as a complete list as many other birds can be present within any given season or day of the year.

**Table 11-12: Bird species identified during the Field Survey**

Family	Species Name	Common Name
Anatidae	<i>Anas erythrorhyncha</i>	Redbilled Teal
Anatidae	<i>Alopochen aegyptiacus</i>	Egyptian Goose
Ardeidae	<i>Ardea cinerea</i>	Grey Heron
Ardeidae	<i>Ardea melanocephala</i>	Blackheaded Heron
Ardeidae	<i>Egretta intermedia</i>	Yellowbilled Egret
Ardeidae	<i>Casmerodius albus</i>	Great White Egret
Charadriidae	<i>Vanellus coronatus</i>	Crowned Lapwing
Charadriidae	<i>Vanellus armatus</i>	Blacksmith Lapwing
Coliidae;	<i>Urocolius indicus</i>	Redfaced Mousebird
Columbidae	<i>Streptopelia capicola</i>	Cape Turtle Dove
Columbidae	<i>Streptopelia senegalensis</i>	Laughing Dove
Columbidae	<i>Oena capensis</i>	Namaqua Dove
Estrildidae	<i>Estrilda astrild</i>	Common Waxbill
Laniidae	<i>Lanius collaris</i>	Fiscal shrike
Lybiidae	<i>Trachyphonus vaillantii</i>	Crested Barbet
Malaconotidae	<i>Laniarius ferrugineus</i>	Southern Boubou
Passeridae	<i>Vidua macroura</i>	Pintaled Whydah
Passeridae	<i>Passer melanurus</i>	Cape Sparrow
Phalacrocoracidae	<i>Phalacrocorax lucidus</i>	White breasted Cormorant
Ploceidae	<i>Ploceus velatus</i>	Southern Masked Weaver
Pycnonotidae	<i>Pycnonotus barbatus</i>	Darkcapped Bulbul
Sturnidae	<i>Lamprotornis nitens</i>	Cape Glossy Starling
Threskiornithidae	<i>Bostrychia hagedash</i>	Hadedda Ibis
Threskiornithidae	<i>Threskiornis aethiopicus</i>	Sacred Ibis

### 11.1.7.2.3 Reptiles and Amphibians

The presence of suitable habitat within the study area should provide a number of different species of amphibians, none, however, were recorded. This may indicate a severely degraded grassland system or simply the result of a poor sampling period for amphibians specifically. The sampling period, November 2015, was poor for amphibians as it was carried out at the end of the wet season.

### **11.1.7.3 Protected Areas**

Provincially or Nationally protected areas that occur close to a project site could have consequences as far as impact on these areas is concerned. The extension site is not in close proximity to any protected areas. The proposed area also does not fall within or close to any Important Bird Areas (IBA), the nearest, Suikerbosrand Nature Reserve IBA, is about 35 km from the project site. There are no areas within 50 km of the proposed development that are earmarked for conservation under the National Protected Areas Expansion Strategy (NPAES).

The list of national Threatened Ecosystems has been gazetted (NEM:BA: National list of ecosystems that are threatened and in need of protection) and result in several implications in terms of development within these areas. These areas are essential for conservation of the country's ecosystems as well as meeting conservation targets. The study area occurs within a vulnerable ecosystem below, the Central Free State Grassland (Plan 9, Appendix A).

### **11.1.8 Wetlands**

No wetland delineation was undertaken, however, one National Freshwater Ecosystem Priority Area (NFEPA) wetland was identified within the eastern section of the project site. The area extent of this wetland is approximately 2.4 ha of which 1.3 ha lies within the project area.

The closest wetland outside the project area is 160 m from the south western edge of the Mining Right extension; the R716 road separates the wetland from the Mining Right extension. A Water Use License Application (WULA) is required for the mining activities associated with the application area as the wetland is located within 500 m of the project area.

### **11.1.9 Surface Water**

#### **11.1.9.1 Catchment Description**

The expanded mining area is located in the Upper Vaal Water Management Area (WMA 08) within quaternary catchment C22F. The expanded mining area occupies 0.04% of the C22F quaternary catchment.

The surface water attributes of the affected catchments, namely Mean Annual Runoff (MAR), Mean Annual Precipitation (MAP) and Mean Annual Evaporation (MAE) are summarised in Table 11-13 which indicates a ratio of precipitation to evaporation at 40 %, with 3 % of the rainfall becoming runoff (WRC, 2005).

**Table 11-13: Summary of the Surface Water Attributes of the C22F Quaternary Catchment**

Quaternary Catchment	Total Area (km <sup>2</sup> )	Rainfall Zone	MAP (mm)	MAR (mm)	MAR m <sup>3</sup> * 10 <sup>6</sup>	Evaporation Zone	MAE (mm)
C22F	440	11A	655	20.5	9.04	C2C	1650

Source: WRC, 2005

### 11.1.9.2 Water Resources

There are no rivers or streams within or in proximity to the proposed expanded mining area. The closest river is the Vaal River approximately 4 km east of the site. The Taaibosspruit is situated in excess of 6 km to the south west of the proposed expanded mining area and is a tributary of the Vaal River.

The 1:50 year flood line of the Vaal River in the catchment is situated on the 1 434 mamsl contour line, with the expanded mining area being located at 1 450 mamsl. The mining of the expanded area will, therefore, fall outside of the 1:50 year flood line, as determined by Randwater (EMP Amendment, 2010).

### 11.1.10 Groundwater

Two aquifer types occur in the Vryheid formation. The upper weathered aquifer consists of transported or in-situ weathered material and is between 5 – 12 m thick. The other aquifer is the lower fractured Karoo aquifer which includes the underlying Ecca sediments, this aquifer is recharged by the interflow from the weathered aquifer.

The regional groundwater levels vary from approximately 5 m below the surface in the lower lying areas to a maximum of 22 m below the ground. Groundwater yields are classed as low, with 83% of boreholes on record producing less than 2 l/s in the Vryheid Formation (Harvest Potential Map, Vegter, 1996).

According to regional analysis (Barnard, 2000) the quality of groundwater is indicated by the average electrical conductivity value of 57 mS/m and a mean pH of 7.5. There are however, significant variation in concentrations of sodium, chloride and sulphate which indicates contamination by the surrounding coal mining activities.

### 11.1.11 Socio-Economic and Political Structure

#### 11.1.11.1 Population Density, Growth and Location

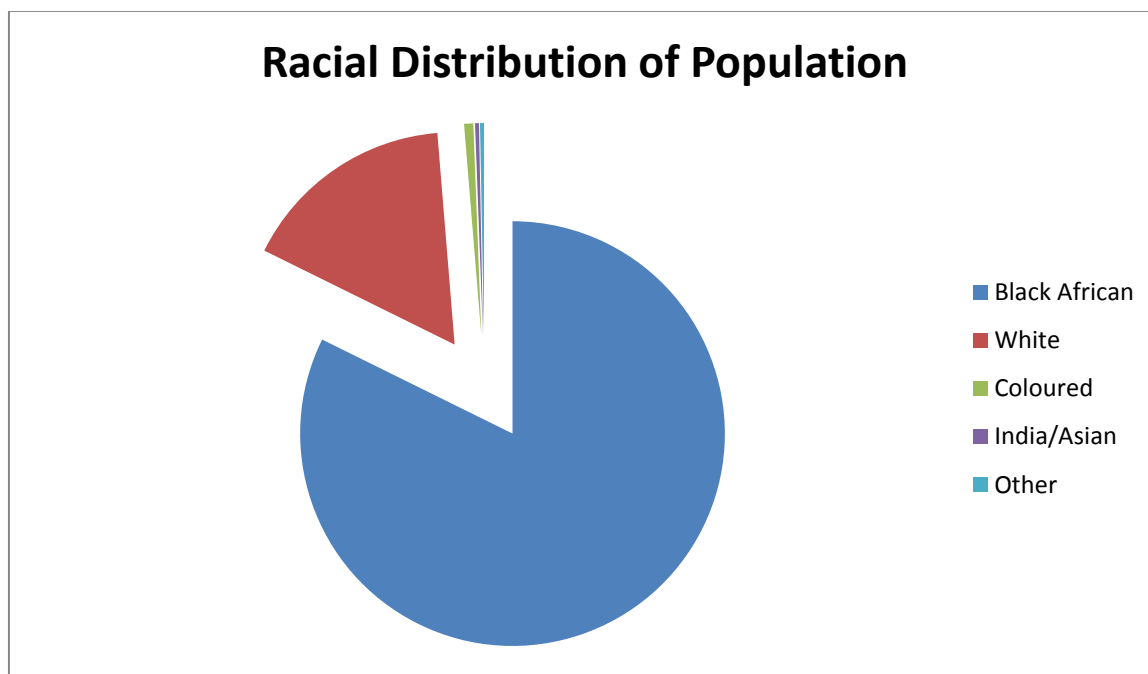
Within the MLM the total population was estimated at 154 658 people in 2013, according to the Metsimaholo Municipality Annual Report (2012/2013) (MM Annual Report). This is an increase from the 149 109 people recorded in 2011 by StatsSA (Census, 2011), and 137 481 in 2007 by Global Insight (GI) (Table 11). The Local Municipality covers an area of 1 739 km<sup>2</sup> and includes the towns of Sasolburg, Deneysville and Oranjeville, among others.

Approximately, 90 % of the population live within urban areas of the municipal region (MM Annual Report, 2012/2013).

**Table 11: Population Statistics for Metsimaholo Local Municipality, 2001 to 2013**

	Census 2001	Global Insight (GI) 2007	Census 2011	MM Annual Report 2013
<b>Metsimaholo Local Municipality Population</b>	115 955	137 481	149 109	154 658

In terms of racial population distribution according to the Census (2011), majority of the population is black African, with approximately 16 % being White. Coloured, Indian / Asian and other races represent a minimal percentage of the population, as resembled in Figure 11-14.



**Figure 11-14: Racial Distribution of Population (Source Census, 2011)**

#### **11.1.11.2 Major Economic Activities and Sources of Employment**

While mining and industry dominate the Sasolburg and Deneysville areas of the municipality, agricultural activities tend to dominate the remainder of the region. A fairly significant portion of the area is currently under cultivation, which is attributed to the availability of water for irrigation purposes. Maize, sunflowers and sorghum tend to be the predominant plant crops grown in the area. Stock farming in the region focuses on grazing and dairy farming.



### **11.1.11.3 Unemployment Estimate for the Area**

According to the GI (2009), 43 528 people were employed, within the municipality, of the 50 061 economically active population; approximately 16.9 % of the population is unemployed. It is expected that informal areas, such as Zamdela, will consist of higher unemployment rates than Sasolburg and Deneysville.

### **11.1.11.4 Access to Basic Services**

According to the 2011 Census, 93.8 % of the municipal population had access to piped water inside the dwelling and yard. 24 % of households did not have access to flush toilets or ventilated pit latrines and 78.9 % of households received a weekly refuse removal service. More than 80 % of households had access to electricity for lighting and cooking.

### **11.1.11.5 Project Area Development**

The affected environment has been heavily altered through time as is evident in recent aerial imagery. To the west of the local study area, the landscape is dominated by urban development associated with Vanderbijlpark and Sharpeville. To the north of the proposed project, the landscape is utilised for industrial purposes. This has resulted in a high disturbance which ultimately resulted in the transformation of the landscape from its natural state.

## **11.1.12 Heritage**

The cultural baseline is based on information sources such as previous Heritage Impact Assessments conducted in the area, databases and cartographic resources.

The cultural landscape of the regional and local study area can be categorised by the occurrence of Early Stone Age (ESA), Middle (MSA) and Late Stone Age (LSA) accumulations, and historical settlements including the town of Vereeniging and surrounding farming communities.

The pre-disturbance survey was undertaken by Natasha Higgitt, a qualified and accredited archaeologist on 11 November 2015. The site specific project area was surveyed through pedestrian methods using an unstructured and unsystematic approach. Undisturbed areas located within the site specific area were surveyed, as no significant natural features were present in the area to focus the survey. The survey was recorded as GPS track logs and the landscape was documented through photographic and written records.

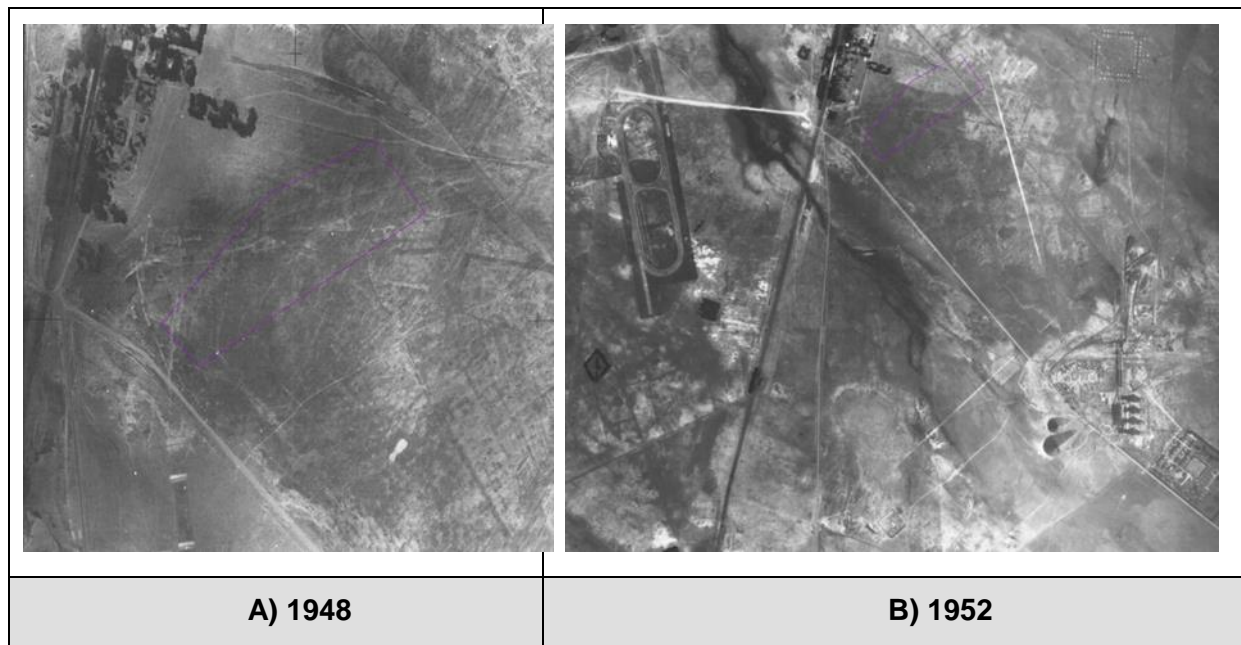
No visible surface evidence of heritage resources was observed within the study area. The soil type (Kroonstad) was instrumental in this. Kroonstad soils drain poorly, have a low nutrient status and are highly erosive (Jackson, 2014). The loose sand is not conducive for long term settlement or extensive agricultural activities. No rocky outcrops or exposed bedrock was identified within the project area.

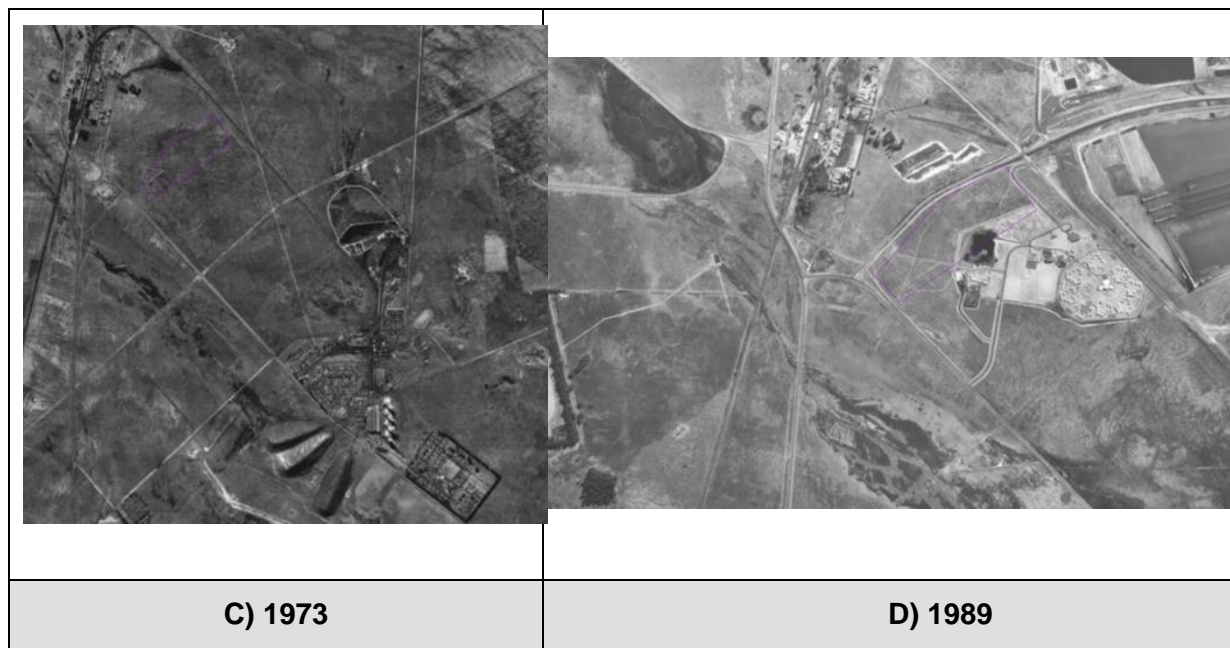
Based on the results of the desktop study and pre-disturbance survey, no heritage impacts are envisioned for the proposed project. Heritage resources were identified at a local level

including Stone Age surface occurrences, burial grounds and historical structures, though none were identified within the site specific project area.

#### ***11.1.12.1 Historical Imagery***

Historical aerial imagery shows how the area surrounding the project has been altered since the 1940s. In 1948, the site specific project area and the surrounding areas are undeveloped areas of veld. The rail siding of Viljoensdrift is visible in the north-western corner of Figure 11-15 A and the old Vaal Power Station is visible in the south-eastern corner. In 1952, the Vaal Power Station complex had been expanded, along with the residential development around it as shown in Figure 11-15 B. By 1973, the Vaal Power Station development has expanded northwards, however the proposed site specific project area is still unaffected directly as seen in Figure 11-15 C. Eventually, by 1989 development has occurred in close proximity to the proposed site specific project area. The current Anglo American Training Centre was built between 1973 and 1989, and a large amount of mining activity has taken place in the surrounding areas (Figure 11-15 D). Additionally, between 1989 and 2005, the Vaal Power Station was decommissioned and demolished as shown in Figure 11-16.





**Figure 11-15: Aerial imagery of the extension site (A) 1948; B) 1952; C) 1973; and D) 1989)**



**Figure 11-16: 2005 aerial imagery of the proposed project site**

#### **11.1.12.2 Paleontological Sensitivity**

The project area is underlain by the Madzaringwe Formation of the Karoo Supergroup. The formation consists of fluvial sandstones, siltstones, shales and coals. The study area is generally flat and the soils are derived from Aeolian sand moved in over local colluvium derived from Ecca Sandstone.

The base of the Karoo sequence in the study area consists of rocks of the Dwyka Group. The Group consist of a complex mixture of sandstones, feldspathic sandstones, mudstones, conglomerates and both in-situ and reworked tillites. Overlying the Dwyka Group is the Ecca Group. (Johnson, Anhaeusser, & Thomas, 2006).



Additionally, the fossil flora found within the Madzaringwe formation (*Glossopteris*) are of global importance as they are rare and have contributed to a great deal of debate within the research community (Adendorff, et al., 2002; Prevec, 2012).

**Table 11-14: Lithographic units and fossil sensitivity (adapted from Johnson *et al.*, 2006 and SAHRIS<sup>8</sup>)**

Ma	Eon	Era	Lithostratigraphic units		Lithology	Sensitivity	Fossils
250	Phanerozoic	Mesozoic	Karoo Supergroup	Ecca Group	Madzaringwe Formation	Very High	Glossopterid coal flora

According to the SAHRIS PalaeoSensitivity Map, the site specific area is located in an area of very high palaeontological sensitivity as depicted. The Madzaringwe Formation is highly significant due to the potential for *Glossopterid* coal flora fossils within the formation.

The soils of the site specific project extend between 1.2 m and 6 m deep. Taking this into consideration, the Madzaringwe Formation is assumed to be deeper than the proposed 3 m depth of the mining activities and will not be impacted on.

#### **11.1.12.3 Stone Age and Rock Art**

Sites associated with the Stone Age have been identified in the local study area but not in the Mining Right extension. Pistorius (2007) notes the numerous Stone Age sites discovered along the ancient banks of the Vaal and Klip Rivers. Van Schalkwyk (1998) notes that the Vaal River gravels remain an important source of information on the ESA which is associated with the Oldowan and Acheulian industries. These resources are significant as they are contributing to the understanding of early hominid cognitive evolution through the examination of stone tool production techniques (Leader IV, 2009).

In Fourie (2007) open scatters associated with the LSA (Fourie – 2007/MHC001) were identified 3.5 km from the project area. The LSA is typically associated with the transition from the MSA some 20 thousand years ago (kya) in which a series of technological innovations in the form of microliths were introduced. These tools were often shaped through secondary retouch into a variety of formal tools suited to hafting.

#### **11.1.12.4 Historical Period**

Historically, the town of Vereeniging, just north of Viljoensdrift, was established in 1882 and proclaimed in 1889. It is significant as it played host to several prominent figures and events.

<sup>8</sup> <http://www.sahra.org.za/sahris/fossil-heritage-layer-browser> accessed 23/04/2015



Prior to the Anglo-Boer War, President Kruger of the Zuid Afrikaanse Republiek (ZAR) and President Reitz of the Orange Free State met for the official opening of the first railway crossing of the Vaal River in 1892. This is seen in the Jeppe's 1899 Map of the Transvaal in which the station at Viljoensdrift and railway is clearly depicted in Figure 11-17.

The town also hosted Boer Generals Botha, Hertzog, Smuts, de la Rey and Lord Milner and General Kitchener in May 1902 to negotiate the Peace Treaty with Great Britain after the Anglo-Boer War (Fourie, 2007). The site is indicated today by a sawn-off tree trunk near the Vereeniging Refractories' Recreation Hall. Subsequent to this, the regional study area has been dominated by mining activities which has left the landscape heavily disturbed.



**Figure 11-17: Extract from Jeppe's 1899 Map of the Transvaal showing the project area**

The literature review did not identify any Stone Age or Farming Community heritage resources within the site specific area.

### 11.1.12.5 Cultural Significance

Cultural Significance (CS) was determined based on identified resources' importance or contribution to four broad value categories: aesthetic, historical, scientific and social values. The resources' importance or contributions to these values were considered in terms of associative (qualitative) and / or rarity (quantitative) attributes. The CS assigned to the identified Madzaringwe Formation is summarised in Table 11-15 and presented in detail in Table 11-16.

**Table 11-15: Summary of identified heritage resources CS**

Summary of Identified Heritage Resources and CS	Number
<b>Very High CS</b>	<b>1</b>
<b>Natural Feature</b>	1
Madzaringwe Formation	1
<b>Grand Total</b>	<b>1</b>

The Madzaringwe Formation is a highly significant geological formation due to the important plant fossils (*Glossopteris*) that are present within the formation. The motivation is based on this formation's global scientific importance and due to the fossils contained within it being under-collected during recent years. The integrity of the formation underlying the Copper Sunset Project area was also considered to be excellent, thereby contributing to a very high significance rating. This rating is consistent with the sensitivity rating provided in the SAHRIS Fossil Heritage Layer Browser.

**Table 11-16: CS of identified heritage resources**

<b>Resource ID</b>	Madzaringwe Formation
<b>Type</b>	Natural feature
<b>Description</b>	Madzaringwe Formation with potential Glossopterid coal flora
<b>Cultural Significance</b>	Very High
<b>CS Motivation</b>	The geological formation can be considered in particular dimensions against scientific criteria.
<b>Field Rating</b>	General Protection IV A
<b>Field Rating Motivation</b>	The heritage sites are defined according to section 2 of the NHRA and are generally protected under Section 35 of the NHRA
<b>Mitigation</b>	Based on the project activities, there is no need for mitigation measures.



## 11.2 Type of environment affected by the proposed activity

There are no rivers or streams within or in proximity to the proposed expanded mining area. The closest river is the Vaal River approximately 4 km east of the site. The Taaibosspuit is situated in excess of 6 km to the south west of the proposed expanded mining area and is a tributary of the Vaal River.

Two aquifer types occur in the Vryheid formation. The upper weathered aquifer consists of transported or in-situ weathered material and is between 5 – 12 m thick. The other aquifer is the lower fractured Karoo aquifer which includes the underlying Ecca sediments, this aquifer is recharged by the interflow from the weathered aquifer.

The regional groundwater levels vary from approximately 5 m below the surface in the lower lying areas to a maximum of 22 m below the ground. Groundwater yields are classed as low, with 83% of boreholes on record producing less than 2 l/s in the Vryheid Formation (Harvest Potential Map, Vegter, 1996).

A portion of a wetland was identified within the application area and the nearest wetland outside of the application area is located 160 m south west of the Mining Right extension area. The R716 road separates this wetland from the Mining Right extension therefore limited potential impacts such as increased siltation are anticipated. The groundwater in the study area is not expected to be impacted as this is located between 5 – 22 m below the surface and the sand resource to be mined to a depth no greater than 3 m.

The local study area is situated within the Grassland Biome with a relatively flat topography (Mucina & Rutherford, 2006). The natural veld that would mainly consist of *Cymbopogon plurinodis* and *Cynodon dactylon* is greatly altered through old ploughed areas, plantations, illegal dumping, and coal mining.

## 11.3 Description of the current land uses

The natural veld that would mainly consist of *Cymbopogon plurinodis* and *Cynodon dactylon* is greatly altered through old ploughed areas, plantations, illegal dumping, and coal mining. The farms currently belong to Anglo Operations and were previously mined for coal. The area now is degraded grassland which has been left fallow. The current land use is rehabilitated grassland that was previously mined for coal deposits. The surrounding land uses are mainly agricultural activities (stock farming focusing on grazing and dairy farming) and mining activities.

## 11.4 Description of specific environmental features and infrastructure on the site

There is currently no infrastructure on the proposed project site with none planned for the future. The land is rehabilitated grassland which was previously mined for coal and before that was agricultural land. The environment is categorised as degraded grassland supported with a number of alien invasive species being recorded through baseline investigations in November 2015.

## 12 Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts

The potential impacts are discussed according to each phase of the proposed project: the Establishment, Operational and Decommissioning Phases. The project activities are summarised in Table 12-1.

This section also rates the significance of the potential impacts pre-mitigation and post-mitigation. The impacts below are a result of both the environment in which the activity takes place, as well activity itself. The impacts associated with the project include the NEMA EIA Regulations Listed Activities, as well as the mining and associated activities to take place at the extension site. The methodology utilised to assess the significance of the potential impacts is described in Section 12.1.

**Table 12-1: Summary of Project Activities**

Activity No.	Activity
Establishment Phase	<ul style="list-style-type: none"> <li>▪ Site clearance and vegetation removal;</li> <li>▪ Establishment of access roads / tracks; and</li> <li>▪ Stockpiling of topsoil.</li> </ul>
Operation Phase	<ul style="list-style-type: none"> <li>▪ Mining of sand resources; and</li> <li>▪ Transportation of sand.</li> </ul>
Closure and Rehabilitation Phase	<ul style="list-style-type: none"> <li>▪ Backfilling of the mined excavations with topsoil; and</li> <li>▪ Rehabilitation (topsoil cover, ripping and vegetation establishment).</li> </ul>

## 12.1 Methodology used in determining and ranking the nature, significance, consequence, extent, duration and probability of potential environmental impacts and risks

The methodology used to assess the significance of potential social and heritage impacts is described below. The significance rating formula is as follows:

$$\text{Significance} = \text{Consequence} \times \text{Probability}$$

Where

$$\text{Consequence} = \text{Type of Impact} \times (\text{Intensity} + \text{Spatial Scale} + \text{Duration})$$

And

$$\text{Probability} = \text{Likelihood of an Impact Occurring}$$

In addition, the formula for calculating consequence:

$$\text{Type of Impact (Nature)} = +1 \text{ (Positive Impact) or } -1 \text{ (Negative Impact)}$$

The weight assigned to the various parameters for positive and negative social and heritage impacts is provided for in the formula and is presented in Table 12-2. The probability consequence matrix for social and heritage impacts is displayed in Table 12-3, with the impact significance rating described in Table 12-4.

**Table 12-2: Impact Assessment Parameter Ratings**

Rating	Intensity / Replacability		Extent	Duration / Reversibility	Probability
	Negative Impacts	Positive Impacts			
7	Irreplaceable loss or damage to biological or physical resources or highly sensitive environments. Irreplaceable damage to highly sensitive cultural/social resources.	Noticeable, on-going natural and / or social benefits which have improved the overall conditions of the baseline.	<u>International</u> The effect will occur across international borders.	Permanent: The impact is irreversible, even with management, and will remain after the life of the project.	Definite: There are sound scientific reasons to expect that the impact will definitely occur. >80% probability.
6	Irreplaceable loss or damage to biological or physical resources or moderate to highly sensitive environments. Irreplaceable damage to cultural/social resources of moderate to highly sensitivity.	Great improvement to the overall conditions of a large percentage of the baseline.	<u>National</u> Will affect the entire country.	Beyond project life: The impact will remain for some time after the life of the project and is potentially irreversible even with management.	Almost certain / Highly probable: It is most likely that the impact will occur. <80% probability.

Rating	Intensity / Replacability		Extent	Duration / Reversibility	Probability
	Negative Impacts	Positive Impacts			
5	Serious loss and/or damage to physical or biological resources or highly sensitive environments, limiting ecosystem function. Very serious widespread social impacts. Irreparable damage to highly valued items.	On-going and widespread benefits to local communities and natural features of the landscape.	<u>Province/ Region</u> Will affect the entire province or region.	Project Life (>15 years): The impact will cease after the operational life span of the project and can be reversed with sufficient management.	Likely: The impact may occur. <65% probability.
4	Serious loss and/or damage to physical or biological resources or moderately sensitive environments, limiting ecosystem function. On-going serious social issues. Significant damage to structures / items of cultural significance.	Average to intense natural and / or social benefits to some elements of the baseline.	<u>Municipal Area</u> Will affect the whole municipal area.	Long term: 6-15 years and impact can be reversed with management.	Probable: Has occurred here or elsewhere and could therefore occur. <50% probability.



Rating	Intensity / Replacability		Extent	Duration / Reversibility	Probability
	Negative Impacts	Positive Impacts			
3	Moderate loss and/or damage to biological or physical resources of low to moderately sensitive environments and, limiting ecosystem function. On-going social issues. Damage to items of cultural significance.	Average, on-going positive benefits, not widespread but felt by some elements of the baseline.	<u>Local</u> Local extending only as far as the development site area.	Medium term: 1-5 years and impact can be reversed with minimal management.	Unlikely: Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur. <25% probability.
2	Minor loss and/or effects to biological or physical resources or low sensitive environments, not affecting ecosystem functioning. Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Low positive impacts experience by a small percentage of the baseline.	<u>Limited</u> Limited to the site and its immediate surroundings.	Short term: Less than 1 year and is reversible.	Rare / improbable: Conceivable, but only in extreme circumstances. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures. <10% probability.

Rating	Intensity / Replacability		Extent	Duration / Reversibility	Probability
	Negative Impacts	Positive Impacts			
1	Minimal to no loss and/or effect to biological or physical resources, not affecting ecosystem functioning. Minimal social impacts, low-level repairable damage to commonplace structures.	Some low-level natural and / or social benefits felt by a very small percentage of the baseline.	<u>Very limited/Isolated</u> Limited to specific isolated parts of the site.	Immediate: Less than 1 month and is completely reversible without management.	Highly unlikely / None: Expected never to happen. <1% probability.

**Table 12-3: Probability / Consequence Matrix**

		Significance																																					
Probability	7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
	6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
	5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
	4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
	3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
	2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
	1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		Consequence																																					

**Table 12-4: Significance Rating Description**

Score	Description	Rating
109 to 147	A very beneficial impact that may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change	Major (positive)
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and / or social) environment	Moderate (positive)
36 to 72	An important positive impact. The impact is insufficient by itself to justify the implementation of the project. These impacts will usually result in positive medium to long-term effect on the natural and / or social environment	Minor (positive)
3 to 35	A small positive impact. The impact will result in medium to short term effects on the natural and / or social environment	Negligible (positive)
-3 to -35	An acceptable negative impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the natural and / or social environment	Negligible (negative)
-36 to -72	An important negative impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the natural and / or social environment	Minor (negative)
-73 to -108	A serious negative impact which may prevent the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term change to the (natural and / or social) environment and result in severe effects	Moderate (negative)
-109 to -147	A very serious negative impact which may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects	Major (negative)

## 12.2 Establishment Phase

The Establishment Phase involves the stripping and stockpiling of topsoil for the specific strip to be mined, as well as the clearing of vegetation. The topsoil will be stockpiled along the mined out strip not exceeding 3 m in height. A temporary access road will be constructed alongside the strip to be mined. No physical construction will take place as no permanent infrastructure will be established on the project site.

### 12.2.1 Soil and Land Capability Impacts

The Establishment phase will result in the removal of vegetation, stockpiling of topsoil and establishment of access roads / tracks. The impacts of these activities on soils include the potential of soil compaction, soil erosion and the loss of topsoil resources. Currently the area is classed as degraded grassland which has been left fallow. The general study area includes extensive farmland and mining.

The impacts associated with soil and land capability during the Establishment Phase, as well as the significance ratings and potential mitigation measures, are detailed in Table 12-5.

**Table 12-5: Pre-Mitigation and Post-Mitigation Significance Ratings for Impacts on Soils during the Establishment Phase**

Criteria	Details / Discussion				
Activities	<ul style="list-style-type: none"> <li>▪ Site clearance and vegetation removal</li> <li>▪ Establishment of access roads / tracks</li> <li>▪ Stockpiling of topsoil</li> </ul>				
Description of impact	<ul style="list-style-type: none"> <li>▪ Soil compaction due to movement of machinery; and</li> <li>▪ Soil erosion and ultimate loss of topsoil resources and land capability due to site clearance and stockpiling of topsoil.</li> </ul>				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Only clear vegetation and remove topsoil when and where necessary; and</li> <li>▪ Ensure topsoil is stockpiled along the mined out strip and is less than 3 m high.</li> </ul>				
<i>Parameters</i>	<i>Spatial</i>	<i>Duration</i>	<i>Intensity</i>	<i>Probability</i>	<i>Significant rating</i>
Pre-Mitigation	2	2	3	6	Minor (negative) - 42
Post-Mitigation	1	2	2	5	Negligible (negative) - 25



## 12.2.2 Fauna and Flora Impacts

The study site comprises a total of 43 flora species. Some of the most common species include: *Themeda triandra*, *Eragrostis gummiflua* and *Digitaria eriantha*. 24 avi-fauna species were identified, including *Anas erythrorhyncha*, *Alopochen aegyptiacus* and *Ardea cinerea*, and no red data species were recorded. The presence of dung and spoor was recorded which suggests that animals were present in the area. No reptiles or amphibians were recorded this could be due to the degraded grassland system or sampling period.

The impacts associated with fauna and flora during the Establishment Phase, as well as the significance ratings and potential mitigation measures, are detailed in Table 12-6.

**Table 12-6: Pre-Mitigation and Post-Mitigation Significance Ratings for Impacts on Fauna and Flora during the Establishment Phase**

Criteria	Details / Discussion				
Activities	<ul style="list-style-type: none"> <li>▪ Site clearance and vegetation removal</li> <li>▪ Establishment of access roads / tracks</li> </ul>				
Description of impact	<ul style="list-style-type: none"> <li>▪ Direct loss of vegetation due to site clearing and the subsequent loss of faunal habitats.</li> </ul>				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Reduce the project footprint by clearing only the strips and associated access road / track to be mined out; and</li> <li>▪ Plant SSC, such as <i>Boophone disticha</i>, must be removed as per provincial authorisation and transplanted as per regulations.</li> </ul>				
Parameters	Spatial	Duration	Severity	Probability	Significant rating
Pre-Mitigation	3	5	3	7	Moderate (negative) -77
Post-Mitigation	3	5	3	4	Minor (negative) - 44



### 12.2.3 Wetland Impacts

One National Freshwater Ecosystem Priority Area (NFEPA) wetland was identified within the eastern section of the project site. The area extent of this wetland is approximately 2.4 ha of which 1.3 ha lies within the project area. The closest wetland outside the boundary of the project site is 160 m from the south western edge. The R716 road separates the wetland from the project site, therefore, impacts to this wetland are unlikely.

The impacts associated with wetlands during the Establishment Phase, as well as the significance ratings and potential mitigation measures, are detailed in Table 12-7.

**Table 12-7: Pre-Mitigation and Post-Mitigation Significance Ratings for Impacts on Wetlands during the Establishment Phase**

Criteria	Details / Discussion				
Activities	<ul style="list-style-type: none"> <li>▪ Site clearance and vegetation removal</li> <li>▪ Establishment of access roads / tracks</li> <li>▪ Stockpiling of topsoil</li> </ul>				
Description of impact	<ul style="list-style-type: none"> <li>▪ Site clearing and the establishment of access roads / tracks will expose soils and increase the risk of erosion and windblown dust. This may result in siltation along the drainage lines of the wetland within the Project area. It is recommended that a 100 m buffer be implemented between mining activities and the wetland. The R716 road lies between the application area and the nearest wetland outside of the application area, reducing the likelihood of such an impact.</li> </ul>				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Ensure site clearing is limited to the designated areas;</li> <li>▪ Berms must be constructed around the periphery of the mining site to separate clean and dirty water. Water within the mining site must be diverted to the water sump;</li> <li>▪ The use of dust suppression measures such as watering must be implemented to avoid windblown dust; and</li> <li>▪ It is recommended that all watercourses be avoided through the implementation of a 100 m buffer zone</li> </ul>				
<i>Parameters</i>	<i>Spatial</i>	<i>Duration</i>	<i>Intensity</i>	<i>Probability</i>	<i>Significant rating</i>
Pre-Mitigation	3	2	3	5	Minor (negative) - 40
Post-Mitigation	1	2	2	3	Negligible (negative) - 15



## 12.2.4 Surface Water Impacts

No impacts are anticipated for surface water resources (excluding wetlands which are discussed above). There are no rivers, streams or dams within or in proximity to the application area. The closest river is the Vaal River approximately 4 km east of the site. The spatial extent of potential surface water related impacts such as dust generation and soil erosion as a result of site clearance are anticipated to extend only as far as the development site area. Mitigation measures including berms around the periphery of the site to separate clean and dirty water and cut off trenches will be constructed for the purpose of clean and dirty water separation.

The application area accounts for less than 0.05% of the catchment; therefore, impacts to the reduction in catchment yield are considered insignificant.

## 12.2.5 Air Quality Impacts

The air quality dust fallout model observed exceedances in 2015. Deposition rates at the sites were all within the non-residential limit (1200 mg/m<sup>2</sup>/d). However, a few of the sites recorded deposition rates higher than the residential limit of 600 mg/m<sup>2</sup>/d. The exceedances recorded were not in consecutive months (at the same site location), according to dust fallout standards, permissible exceedance is twice within a year but not in sequential months. Dust fallout impacts as a result of the establishment phase are anticipated for nearby receptors such as the Anglo New Vaal Colliery Community adjacent to the project site Centre and Viljoensdrif settlement north of the project site.

The impact assessment rating for air quality is presented in Table 12-8.

**Table 12-8: Pre-Mitigation and Post-Mitigation Significance Ratings for Impacts on Air Quality during the Establishment Phase**

Criteria	Details / Discussion
Activities	<ul style="list-style-type: none"> <li>▪ Site clearance and vegetation removal</li> <li>▪ Establishment of access roads / tracks</li> <li>▪ Stockpiling of topsoil</li> </ul>
Description of impact	<ul style="list-style-type: none"> <li>▪ The levels of dust are anticipated to increase during the stripping and removal of vegetation as well as the loading and offloading of sand material. This is anticipated to cause a social nuisance impact for nearby receptors, mainly the Anglo New Vaal Colliery Community Centre.</li> </ul>
Mitigation required	<ul style="list-style-type: none"> <li>▪ Only clear vegetation and remove topsoil when and where necessary;</li> <li>▪ Ensure topsoil is stockpiled along the mined out strip and is less than 3 m high.</li> <li>▪ Use of dust suppression measures such as watering must be implemented on the access roads; and</li> </ul>





Criteria	Details / Discussion				
	<ul style="list-style-type: none"> <li>Drop heights must be minimised during sand loading.</li> </ul>				
Parameters	<i>Spatial</i>	<i>Duration</i>	<i>Severity</i>	<i>Probability</i>	<i>Significant rating</i>
Pre-Mitigation	4	2	4	6	Minor (negative) - 60
Post-Mitigation	2	2	2	4	Negligible (negative) - 24

### 12.2.6 Noise Impacts

The noise model indicates that the noise from the proposed mining activities will not measure above the upper limit of 53dBA (which would constitute disturbing noise according to the Free State Noise Control Regulations) at nearby receptors including the Anglo Coal New Vaal Colliery's Community Centre adjacent to the project site. The model indicates furthermore that the noise from the proposed sand mining activities will not measure above the suburban limit guidelines at the nearest residential neighbourhood Viljoensdrif located 1km north of the proposed area.

The impacts associated with noise during the Establishment Phase, as well as the significance ratings and potential mitigation measures, are detailed in Table 12-9.

**Table 12-9: Pre-Mitigation and Post-Mitigation Significance Ratings for Impacts on Noise during the Establishment Phase**

Criteria	Details / Discussion				
Activities	<ul style="list-style-type: none"> <li>Site clearance and vegetation removal</li> <li>Establishment of access roads / tracks</li> <li>Stockpiling of topsoil</li> </ul>				
Description of impact	<ul style="list-style-type: none"> <li>Mining machinery and vehicles may increase ambient noise levels at surrounding noise sensitive receptors. However, this is not expected to exceed the Noise Control Regulations. This is anticipated to cause a social nuisance impact for nearby receptors mainly the Anglo New Vaal Colliery Community Centre</li> </ul>				
Mitigation required	<ul style="list-style-type: none"> <li>Mining related machines and vehicles are to be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and</li> <li>Switching off equipment when not in use.</li> </ul>				
Parameters	<i>Spatial</i>	<i>Duration</i>	<i>Severity</i>	<i>Probability</i>	<i>Significant rating</i>
Pre-Mitigation	1	2	1	2	Negligible



Criteria	Details / Discussion				
					(negative) - 8
Post-Mitigation	1	2	1	1	Negligible (negative) - 4

### 12.2.7 Social Impacts

No social impacts are anticipated during the Establishment Phase. Copper Sunset currently employs 24 skilled and multi-skilled personnel and this number is expected to remain the same as the extension area is incorporated into Copper Sunset's operations.



## 12.3 Operational Phase

The Operational Phase includes the strip mining of the sand resources and the transportation of the sand to the screening area.

### 12.3.1 Soils and Land Capability Impacts

During the Operational Phase, strip mining will be undertaken as well as the transportation of the sand resource to the screening area. The soil and land capability impacts associated with these activities include the loss of stockpiled topsoil through erosion and sterilisation, soil erosion of bare areas and soil compaction by moving vehicles.

The impacts associated with soil and land capability during the Operational Phase, as well as the significance ratings and potential mitigation measures, are detailed in Table 12-10.

**Table 12-10: Pre-Mitigation and Post-Mitigation Significance Ratings for Impacts on Soils during the Operational Phase**

Criteria	Details / Discussion				
Activities	<ul style="list-style-type: none"> <li>▪ Mining of sand resources</li> <li>▪ Transportation of sand</li> </ul>				
Description of impact	<ul style="list-style-type: none"> <li>▪ Loss of topsoil resources through wind erosion; and</li> <li>▪ Soil compaction from moving vehicles.</li> </ul>				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Dust suppression of topsoil stockpiles must be suppressed with water during windy conditions (Sep – Nov);</li> <li>▪ Ensure topsoil is stockpiled along the mined out strip and is less than 3 m high</li> </ul>				
<i>Parameters</i>	<i>Spatial</i>	<i>Duration</i>	<i>Intensity</i>	<i>Probability</i>	<i>Significant rating</i>
Pre-Mitigation	3	3	3	6	Minor (negative) - 54
Post-Mitigation	2	2	3	4	Negligible (negative) - 28



### 12.3.2 Air Quality Impacts

The air quality dust fallout monitoring observed exceedances in 2015. Deposition rates at the sites were all within the non-residential limit (1 200 mg/m<sup>2</sup>/d). However, a few of the sites recorded deposition rates higher than the residential limit of 600 mg/m<sup>2</sup>/d. The exceedances recorded were not in consecutive months (at the same location), according to dust fallout standards, permissible exceedance is twice within a year but not in sequential months. Dust fallout impacts as a result of the establishment phase are anticipated for nearby receptors such as the Anglo New Vaal Colliery Community adjacent to the project site Centre and Viljoensdrif settlement located 1 km north of the project site.

The impact assessment rating for air quality in the location area is presented in Table 12-11.

**Table 12-11: Pre-Mitigation and Post-Mitigation Significance Ratings for Impacts on Air Quality during the Operational Phase**

Criteria	Details / Discussion				
Activities	<ul style="list-style-type: none"> <li>▪ Mining of sand resources</li> <li>▪ Transportation of sand</li> </ul>				
Description of impact	<ul style="list-style-type: none"> <li>▪ The levels of dust are anticipated to increase during the mining of sand coupled with the loading of sand for transportation. However, dust fallout is not expected to exceed the legal standards if mitigation measures are correctly implemented. This is anticipated to cause a social nuisance impact for nearby receptors mainly the Anglo New Vaal Colliery Community Centre.</li> </ul>				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Use of dust suppression measures must be implemented on the access roads and topsoil stockpiles;</li> <li>▪ Ensure topsoil is stockpiled along the mined out strip and is less than 3 m high.</li> <li>▪ Use of tarpaulins on all trucks transporting the sand material; and</li> <li>▪ Drop heights must be minimised during loading of sand.</li> </ul>				
Parameters	Spatial	Duration	Severity	Probability	Significant rating
Pre-Mitigation	4	5	4	6	Moderate (negative) - 78
Post-Mitigation	2	5	2	4	Minor (negative) - 36



### 12.3.3 Wetland Impacts

One National Freshwater Ecosystem Priority Area (NFEPA) wetland was identified within the eastern section of the project site. The area extent of this wetland is approximately 2.4 ha of which 1.3 ha lies within the project area. The closest wetland outside the boundary of the project site is 160 m from the south western edge. The R716 road separates the wetland from the project site, therefore, impacts to this wetland are unlikely.

The impacts associated with surface water during the Operational Phase, as well as the significance ratings and potential mitigation measures, are detailed in Table 12-12.

**Table 12-12: Pre-Mitigation and Post-Mitigation Significance Ratings for Impacts on Wetlands during the Operational Phase**

Criteria	Details / Discussion				
Activities	<ul style="list-style-type: none"> <li>▪ Mining of sand resources; and</li> <li>▪ Transportation of sand.</li> </ul>				
Description of impact	<ul style="list-style-type: none"> <li>▪ As mining progresses, the movement of eroded material is likely to occur through stormwater flows. This may result in siltation of the wetland within the application area. The R716 road is located between the application area and the nearest wetland outside of the application area, reducing the likelihood of such an impact.</li> </ul>				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Only clear vegetation when and where necessary;</li> <li>▪ The use of dust suppression measures such as watering must be implemented to avoid windblown dust (Sep – Nov);</li> <li>▪ Berms on the periphery of the mining site should be inspected daily and maintained to ensure runoff from within the mining site does not report to the wetland; and</li> <li>▪ It is recommended that a 100 m buffer zone be implemented between the wetlands and mining activities.</li> </ul>				
<i>Parameters</i>	<i>Spatial</i>	<i>Duration</i>	<i>Intensity</i>	<i>Probability</i>	<i>Significant rating</i>
Pre-Mitigation	3	2	3	5	Minor (negative) - 40
Post-Mitigation	1	2	2	3	Negligible (negative) - 15

### 12.3.4 Surface Water Impacts

No impacts are anticipated for all other surface water resources, with the exception of wetlands. The Vaal River is the nearest river which is located 4 km from the application area. The application area accounts for less than 0.05% of the broader quaternary catchment;

impacts to the reduction in catchment yield are considered insignificant. Water quality is unlikely to be impacted due to the distance between the project site and watercourses as well as the berms on the periphery of the mining site and cut off trenches that will be constructed as clean and dirty water separation mechanisms.

### 12.3.5 Noise Impacts

The noise model indicates that the noise from the proposed project mining activities will not measure above the upper limit of 53dBA (which would constitute disturbing noise according to the Free State Noise Control Regulations) at nearby receptors including the dwellings of the Anglo Coal New Vaal Colliery's Community Centre adjacent to the project site. The model indicates furthermore that the noise from the proposed sand mining activities will not measure above the suburban limit guidelines at the residential neighbourhoods Viljoendrif located 1 km north of the proposed new area.

The impacts associated with noise during the Operational Phase, as well as the significance ratings and potential mitigation measures, are detailed in Table 12-13.

**Table 12-13: Pre-Mitigation and Post-Mitigation Significance Ratings for Impacts on Noise during the Operational Phase**

Criteria	Details / Discussion				
Activities	<ul style="list-style-type: none"> <li>▪ Mining of sand resources</li> <li>▪ Transportation of sand</li> </ul>				
Description of impact	<ul style="list-style-type: none"> <li>▪ Mining machinery and vehicles may be a social nuisance due to increased ambient noise levels at surrounding noise sensitive receptors.</li> </ul>				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Mining related machines and vehicles to be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and</li> <li>▪ Switching off equipment when not in use.</li> </ul>				
<i>Parameters</i>	<i>Spatial</i>	<i>Duration</i>	<i>Severity</i>	<i>Probability</i>	<i>Significant rating</i>
Pre-Mitigation	1	5	1	2	Negligible (negative) - 14
Post-Mitigation	1	5	1	1	Negligible (negative) - 7

### 12.3.6 Social Impacts

The extension of Copper Sunset's mining operations will result in continued employment for the current skilled and multi-skilled employees. The Social and Labour Plan for the existing



operation will continue to apply. Additional investment to the value of R2.2 million will be provided for projects such as the establishment of a chick farm, upgrading of schools in the area. This exact allocation will be confirmed with further consultation with local municipality.

The social impacts associated with the neighbouring communities during the Operational phase, as well as significance ratings and potential mitigation measures are detailed in Table 12-14.

**Table 12-14: Pre-mitigation and Post-mitigation Significance Ratings for Impacts on Social Impacts during the Operations Phase**

Criteria	Details / Discussion				
Activities	<ul style="list-style-type: none"> <li>▪ Mining of sand resources</li> <li>▪ Transportation of sand</li> </ul>				
Description of impact	<ul style="list-style-type: none"> <li>▪ Generation of income due to continued employment</li> </ul>				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Provide local employees with reference letters that they can submit to gain further employment.</li> <li>▪ Also, provide certificates of completion for in-house (on-the-job) training provided.</li> </ul>				
<i>Parameters</i>	<i>Spatial</i>	<i>Duration</i>	<i>Intensity</i>	<i>Probability</i>	<i>Significant rating</i>
Pre-Mitigation	2	2	3	7	Minor (positive) 49
Post-Mitigation	2	5	4	7	Moderate (positive) 77



## 12.4 Closure and Rehabilitation Phase

The activities associated with the rehabilitation of the site will entail the back-filing of the mined excavations with topsoil as there will be no overburden material. There will be an overall lowering of the topography of the site, however rehabilitation will be undertaken to ensure the site is contoured and levelled to resemble the pre-mining landscape and that the surface is free draining.

### 12.4.1 Flora and Fauna

During the Closure and Rehabilitation Phase, the mined excavations will be backfilled with topsoil and vegetation will be re-establishment. Impacts associated with this phase are the re-establishment of alien invasive vegetation.

The impacts associated with flora and fauna during the Closure and Rehabilitation Phase, as well as the significance ratings and potential mitigation measures, are detailed in Table 12-15.

**Table 12-15: Pre-Mitigation and Post-Mitigation Significance Ratings for Impacts on Flora and Fauna during the Closure and Rehabilitation Phase**

Criteria	Details / Discussion				
Activities	<ul style="list-style-type: none"> <li>Backfilling of the mined excavations with topsoil</li> <li>Rehabilitation (topsoil cover, ripping and vegetation establishment)</li> </ul>				
Description of impact	<ul style="list-style-type: none"> <li>Vegetation will be re-established during this phase. However, during this phase, alien invasive vegetation may re-establish itself on site.</li> </ul>				
Mitigation required	<ul style="list-style-type: none"> <li>Undertake an alien invasive monitoring programme. This must be done prior to the Establishment phase to ensure no spreading occurs during Establishment, Operational or Closure and Rehabilitation Phase.</li> </ul>				
<i>Parameters</i>	<i>Spatial</i>	<i>Duration</i>	<i>Severity</i>	<i>Probability</i>	<i>Significant rating</i>
Pre-Mitigation	3	4	4	7	Moderate (negative) - 77
Post-Mitigation	3	4	3	5	Minor (negative) - 50





## 12.4.2 Noise Impacts

Machinery used to undertake the activities during the Closure and Rehabilitation Phase is expected to increase ambient noise levels at the surrounding noise receptors such as the Anglo New Vaal Colliery's Community Centre adjacent to the project site and Viljeondrif settlement located 1 km north of the project site. However, the ambient noise levels, although elevated, are expected to will not measure above the upper limit of 53dBA (which would constitute disturbing noise according to the Free State Noise Control Regulations)

The impacts associated with noise during the Rehabilitation Phase, as well as the significance ratings and potential mitigation measures, are detailed in Table 12-16.

**Table 12-16: Pre-Mitigation and Post-Mitigation Significance Ratings for Impacts on Noise during the Rehabilitation Phase**

Criteria	Details / Discussion				
Activities	<ul style="list-style-type: none"> <li>▪ Backfilling of the mined excavations with topsoil</li> <li>▪ Rehabilitation (topsoil cover, ripping and vegetation establishment)</li> </ul>				
Description of impact	<ul style="list-style-type: none"> <li>▪ Mining machinery and vehicles may increase ambient noise levels at surrounding noise sensitive receptors.</li> </ul>				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Mining related machines and vehicles to be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and</li> <li>▪ Switching off equipment when not in use.</li> </ul>				
<i>Parameters</i>	<i>Spatial</i>	<i>Duration</i>	<i>Severity</i>	<i>Probability</i>	<i>Significant rating</i>
Pre-Mitigation	1	2	1	2	Negligible (negative) - 8
Post-Mitigation	1	2	1	1	Negligible (negative) - 4



## **12.5 Cumulative Impacts**

### **12.5.1 Air Quality**

The affected environment has been heavily altered through time as is evident in recent aerial imagery. To the west of the local study area, the landscape is dominated by urban development associated with Vanderbijlpark and Sharpville. To the north of the proposed project, the landscape is utilised for industrial purposes. Although the dust deposition rates for the Copper Sunset operations are predominantly within non-residential rates, exceedances of the NDCR limits have been observed over the period August 2013 to October 2015. In addition, the coal mining operations at New Vaal Colliery, including coal stockpiling, and the operation of the Lethabo Power Station are all sources of potential impacts to the ambient air quality. All activities within the region result in cumulative impacts on air quality.

The new application area associated with Copper Sunset falls within the Vaal Triangle Airshed Priority Area (The Vaal Triangle) declared in terms of section 18(1) of NEM: AQA. The Vaal Triangle is a highly industrialised area housing various industries, a coal fired power station as well as a few collieries and quarries giving rise to noxious and offensive gasses. The proposed Mining Right extension, however, is not expected to increase cumulative impacts on air quality as the application area will succeed the existing operations and sand mining activities across the existing site and application area will not occur concurrently.

### **12.5.2 Noise**

Cumulative impacts should be considered for the overall improvement of ambient noise levels. The proposed project is considered a causative source of noise pollution of low significance.

The nearest mining operations are New Vaal Colliery. The existing noise sources in the immediate area of the proposed project are the New Vaal Colliery coal stock yard, vehicular movement on the R716 as well as the power generation activities at Lethabo Power Station.

According to the dispersion modelling results, the sand mining activities at Copper Sunsets new area, will not significantly contribute to the existing noise sources in area.

## **12.6 Project Related Risks**

The following project risks have been identified for the proposed Project, for which risk avoidance measures have been proposed. These measures shall also be incorporated into the EMP.


**Table 12-17: Associated Project Related Risks**

Potential Project Risk (Unplanned Occurrences)	Aspect Potentially Impacted	Risk Avoidance Measures
Accidental exposure of unidentified heritage resources	Damage and/or destruction of heritage resources generally protected under section 34 to 37 of the NHRA	<p>Chance Finds Procedures (CFPs) must be developed and included as a condition of authorisation that clearly describes the reporting process and appropriate management of the exposure of previously unidentified heritage resources.</p> <p>The established and defined CFPs must be implemented prior to any development taking place as part of the activities</p>
Accidental exposure and damage to palaeontological resources in areas where unidentified Madzaringwe outcrops may occur.	Damage and/or destruction of heritage resources generally protected under section 35 of the NHRA	Fossil Finds Procedures (FFPs) must be included in the EMP that clearly defines the reporting procedures and appropriate management of uncovered palaeontological resources.
Spills and leaks occurring during the operational phase	Contamination of soil and resultant groundwater resource due to seepage.	<ul style="list-style-type: none"> <li>▪ If a spill occurs it is to be cleaned up immediately and reported to the appropriate authorities.</li> <li>▪ All vehicles are to be serviced in a correctly bunded area or at an off-site location.</li> <li>▪ The temporary storage facilities of fuel, lubricants and any wastes must be stored on a hard park, roofed and bunded facility.</li> </ul>
Safety risk in terms of accidents during site establishment and operations.	Accidents may occur due to poor driving conditions or other factors thus impacting on other road users as well as pedestrians.	<ul style="list-style-type: none"> <li>▪ Erect signage to control the speed limit along the proposed route as well as warnings relating to pedestrians potentially crossing.</li> </ul>



## 12.7 The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected

### 12.7.1 Positive Impacts

Positive impacts of the proposed Project can be summarised as follows:

- **Employment** – Copper Sunset is reaching the end of its LoM (approximately September 2017). The mining extension is expected to extend the LoM by a further 9 months. Thus, the current Copper Sunset employees will remain employed for an extended period. Employment as well as the additional infrastructure (access road) will contribute to the overall socio-economic profile of the local area; and
- **Continued Tax Base and Revenue** – The continued mining of sand would result in a significant increase of revenue for Copper Sunset and associated tax contributions towards the country. The market share of the existing operation is about 46% and this is not expected to change as the Mining Right extension comes into operation as this will coincide with the partial depletion of the existing mine.

### 12.7.2 Negative Impacts

Negative impacts of the proposed Project can be summarised as follows:

- **Dust Generation** – During the establishment and operation phase it is expected to have a negative impact on air quality. Site clearing and construction activities may result in fugitive dust emissions. This is expected to be a social nuisance to nearby receptors, mainly the community Viljeondrif north of the project in the predominant wind direction;
- **Noise Generation** – machinery and vehicles will be used in the establishment, operation and rehabilitation phase which will result in an increase in the ambient noise levels, although they are not expected to exceed the Noise Control Regulations limit. This is expected to be a social nuisance to nearby receptors, mainly the Anglo New Vaal Colliery Community Centre, however the noise levels are anticipated to remain within legal limits;
- **Loss of Fauna and Flora Habitat** – the mining extension will result in further site clearance, thus result in the further loss of fauna and flora habitat; and
- **Siltation of wetland** – During the establishment and operational phase exposed soils may result in soil erosion and windblown dust which result in increased siltation of the wetland within the application area.



## 12.8 The Possible Mitigation Measures that could be applied and the Level of Risk

The mitigation measures proposed are indicated below:

- Ensure topsoil is stockpiled along the mined out strip and is less than 3 m high;
- Reduce the project footprint by clearing only the vegetation that is within the proposed project area;
- All soils should be stored and managed correctly for rehabilitation;
- Species such as *Boophone disticha*, must be removed as per provincial authorisation and transplanted as per regulations;
- Berms must be constructed around the periphery of the mining site to separate clean and dirty water. Water within the mining site must be diverted to the water sump;
- It is recommended that all watercourses (such as the identified wetland) should be avoided by implementing a 100 m buffer;
- Use of dust suppression measures must be implemented on the access roads;
- Drop heights must be minimised during sand loading;
- Mining related machines and vehicles are to be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers;
- Switching off equipment when not in use;
- Vehicles will obey speed limits (30 km/h);
- Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided; and
- Promote labour -intensive construction methods.

## 12.9 Motivation where no alternatives sites were considered

No location alternatives were considered as the location of the mining activity is determined by the location of the resource. The mineral bearing potential of the proposed expansion area is well known and located adjacent to the deposit currently being mined by Copper Sunset. Thus, no infrastructure will be constructed as the mined material can be transported to the current mining operations of Copper Sunset from where the sand will be distributed to the local and regional construction clients.

Furthermore, an existing unused road can be used to access the extension area which avoids further potential impacts associated with a road construction. Access to the mining strips will be through access routes which will subsequently be mined, which limits the footprint of land cleared to only the areas that will at some stage be mined.



No alternatives were considered for the method of mining as strip mining is already being undertaken by Copper Sunset adjacent to the application area. The deposit lies directly beneath the topsoil layer therefore strip mining was deemed the most effective way of removing the sand resource from the surface. Only one mining strip will be in operation at any one time and concurrent rehabilitation will be carried out when the next mining strip is mined.

## **12.10 Statement motivating the alternative development location within the overall site**

The resources are known for the application area and due to the close proximity to the current Copper Sunset operation, the site will not require any infrastructure to be constructed, only temporary access routes will be established. These access routes will subsequently be mined out. The project area is limited in extent (19.9 ha) and the baseline environment investigations undertaken indicated that the area is of limited environmental sensitivity. No red data species, rivers or streams are present within the application area. A portion of a wetland lies within the project site and it is recommended that a buffer be implemented to avoid impacts.

An alternative site location may not allow for the effective extraction of the mineral deposits and therefore the proposed location has been presented based on the location of the mineral deposit as well as the location of Copper Sunset's existing mining operation.

## **13 Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (In respect of the final site layout plan) through the life of the activity**

The preferred site was selected based on knowledge of the available sand resource as well as the site's proximity to Copper Sunset's current operation and accessibility. Following this selection, baseline environment investigations were undertaken to identify any sensitivities on the preferred site. Please refer to Section 12 for a description of the process undertaken to assess and rank the impacts the proposed project will impose.

The predominant impact is seen as the loss of vegetation, with rehabilitation being the mitigation measure, concurrent rehabilitation will take place as the next strip is mined. Maintenance of the rehabilitated area will ensure non alien invasive species colonise the area.

Exceedances of air quality rates have been observed near the proposed project location, with an increase in mining activities it is recommended that ambient dust deposition be monitored continuously in the area. Dust suppressant should be applied to the access roads.

The proposed project is considered a causative source of noise pollution of low significance however, cumulative impacts should be considered for the overall improvement of ambient



noise levels. The existing noise sources in the immediate area of the proposed project are the New Vaal Colliery coal stock yard, vehicular movement on the R716 as well as the power generation activities at Lethabo power station. According to the dispersion modelling results, the sand mining activities at Copper Sunsets new area, will not significantly contribute to the existing noise sources in area as it will not exceed the legal standards.

Chance Finds and Fossil Finds Procedures must be implemented in the proposed area as a mitigation measure for heritage resources.

Refer to Section 14 below for a description of all environmental issues and risks that were identified during the environmental impact assessment process.

## **14 Assessment of each identified potentially significant Impact and Risk**

The potential impacts per activity are detailed in Table 14-1. The impacts per project phase are outlined in Section 12 above and indicate the mitigation measures proposed, as well as the impact significance pre-mitigation and post mitigation.

**Table 14-1: Assessment of each Identified Impact**

Project Activity	Potential Impact	Aspects Affected	Phase	Significance (Pre-Mitigation)	Mitigation Type	Significance (Post-Mitigation)
<b>Establishment Phase</b>						
Site clearance and vegetation removal Establishment of access roads Stockpiling of topsoil	Dust generation	Air Quality	Establishment Phase	Minor Negative	Control through: <ul style="list-style-type: none"> <li>Dust Management Plan.</li> <li>Vegetation Establishment.</li> </ul>	Negligible Negative
	Soil compaction and soil erosion	Soils	Establishment Phase	Minor Negative	Control through: <ul style="list-style-type: none"> <li>Soil stripping procedure.</li> </ul>	Negligible Negative
	Loss of fauna and flora species	Fauna and Flora	Establishment Phase	Moderate Negative	Avoid through: <ul style="list-style-type: none"> <li>Limitation of infrastructure footprint.</li> </ul>	Minor Negative
	Sedimentation of wetlands	Wetlands	Establishment Phase	Minor Negative	Prevent through: <ul style="list-style-type: none"> <li>Storm Water Management Plan.</li> </ul> Avoid through: <ul style="list-style-type: none"> <li>Implementation of buffer zones.</li> </ul>	Negligible Negative
	Noise generation	Noise	Establishment Phase	Negligible Negative	Control through: <ul style="list-style-type: none"> <li>Operating hours;</li> <li>Use of silencers; and</li> </ul>	Negligible Negative



Project Activity	Potential Impact	Aspects Affected	Phase	Significance (Pre-Mitigation)	Mitigation Type	Significance (Post-Mitigation)
					<ul style="list-style-type: none"> <li>Routine maintenance and services.</li> </ul>	
	Continued Employment	Social	Establishment Phase	Negligible Positive	Manage through supporting workers	Negligible Positive
<b>Operational Phase</b>						
Mining of sand resources Transportation of sand	Soil erosion	Soils	Operational Phase	Minor Negative	Avoid and control through: <ul style="list-style-type: none"> <li>Vegetation establishment.</li> <li>Restrict access.</li> </ul>	Negligible Negative
	Sedimentation of wetlands	Wetlands	Operational Phase	Minor Negative	Avoid through: <ul style="list-style-type: none"> <li>Implementation of buffer zones; and</li> <li>Erosion management through stormwater control.</li> </ul>	Negligible Negative
	Noise Generation	Noise	Operational Phase	Negligible Negative	Control through: <ul style="list-style-type: none"> <li>Operating hours;</li> <li>Use of silencers; and</li> <li>Routine maintenance and services.</li> </ul>	Negligible Negative
	Dust Generation	Air Quality	Operational Phase	Moderate Negative	Control through: <ul style="list-style-type: none"> <li>Dust Management Plan;</li> </ul>	Minor Negative

Project Activity	Potential Impact	Aspects Affected	Phase	Significance (Pre-Mitigation)	Mitigation Type	Significance (Post-Mitigation)
					<ul style="list-style-type: none"> <li>Only remove necessary vegetation</li> </ul>	
	Continued Employment	Social	Operational Phase	Minor Positive	Manage through supporting workers	Moderate Positive
<b>Rehabilitation Phase</b>						
Rehabilitation (topsoil cover, ripping and vegetation establishment)	Establishment of Alien Invasive Species	Flora	Rehabilitation Phase	Moderate Negative	Control through: <ul style="list-style-type: none"> <li>Dust Management Plan.</li> <li>Vegetation establishment.</li> </ul>	Minor Negative
	Noise Generation	Noise	Rehabilitation Phase	Negligible Negative	Control through: <ul style="list-style-type: none"> <li>Operating hours;</li> <li>Use of silencers; and</li> <li>Routine maintenance and services.</li> </ul>	Negligible Negative



## **15 Summary of specialist reports**

No individual specialist reports were compiled, apart from the Heritage Report for submission to SAHRA. Specialist inputs directly into this BAR included the baseline environment, potential impacts and the recommended mitigation measures as highlighted in Table 15-1.

**Table 15-1: Specialist Studies undertaken for the Proposed Project**

List of studies undertaken	Recommendations of specialist reports	Specialist Recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included
Fauna and Flora Impact Assessment	<ul style="list-style-type: none"> <li>▪ Significance of impacts</li> <li>▪ Mitigation measures</li> </ul>	Refer to Part B	All mitigation and management measures included in this report were recommended by the Fauna and Flora Specialist.
Noise Impact Assessment	<ul style="list-style-type: none"> <li>▪ Significance of impacts</li> <li>▪ Mitigation measures</li> </ul>	Refer to Part B	All mitigation and management measures included in this report were recommended by the Noise Specialist.
Air Quality Impact Assessment	<ul style="list-style-type: none"> <li>▪ Significance of impacts</li> <li>▪ Mitigation measures</li> </ul>	Refer to Part B	All mitigation and management measures included in this report were recommended by the Air Quality Specialist.
Heritage Impact Assessment	<ul style="list-style-type: none"> <li>▪ Significance of impacts</li> <li>▪ Mitigation measures</li> </ul>	Refer to Part B	All mitigation and management measures included in this report were recommended by the Heritage Specialist.

## 16 Environmental Impact Statement

### 16.1 Summary of the key findings of the environmental impact assessment

The Environmental Impact Statement is a summary of all the potential environmental impacts identified during each phase of the proposed project. The significance of the impacts associated with the biophysical environment, pre-mitigation and post-mitigation, is summarised in Table 16-1.

The main impacts of concern are the loss of flora and fauna, dust generation and the establishment of alien invasive species. These impacts can be mitigated to minor significance. There are no fatal flaws associated with the proposed project and is further considered to be a suitable activity for the location it is being proposed in.

**Table 16-1: Summary of the Potential Impacts**

Project Activity	Potential Impact	Significance (Pre-Mitigation)	Significance (Post Significance)
Site clearance and vegetation removal Establishment of access roads Stockpiling of topsoil	Dust generation	Minor Negative	Negligible Negative
	Soil compaction and soil erosion	Minor Negative	Negligible Negative
	Loss of fauna and flora species	Moderate Negative	Minor Negative
	Sedimentation of wetlands	Minor Negative	Negligible Negative
	Noise generation	Negligible Negative	Negligible Negative
Mining of sand resources Transportation of sand	Soil erosion	Minor Negative	Negligible Negative
	Sedimentation of surface water resources	Minor Negative	Negligible Negative
	Noise Generation	Negligible Negative	Negligible Negative
	Dust Generation	Moderate Negative	Minor Negative
	Continued Employment	Minor Positive	Moderate Positive
Rehabilitation (topsoil cover, ripping and vegetation establishment)	Establishment of Alien Invasive Species	Moderate Negative	Minor Negative
	Noise Generation	Negligible Negative	Negligible Negative

### 16.2 Final Site Map

The project area is displayed in Plan 2, Appendix A.

### 16.3 Summary of the Positive and Negative Implications and Risks of the Proposed Activity and Identified Alternatives

The positive impacts of the proposed Project can be summarised as follows:

- **Employment** – Copper Sunset is reaching the end of their LoM. The mining extension is expected to extend the LoM by a further 9 months. Thus, the current Copper Sunset employees will remain employed for an extended period. Employment as well as the additional infrastructure (access road) will contribute to the overall socio-economic profile of the region; and
- **Continued Tax Base and Revenue** – The continued mining of sand would result in a significant increase of revenue for Copper Sunset and associated tax contributions towards the country. The market share of the existing operation is about 46% and this is not expected to change as the Mining Right extension comes into operation as this will coincide with the partial depletion of the existing mine.

The negative impacts of the proposed Project can be summarised as follows:

- **Dust Generation** – During the establishment and operation phase it is expected to have a negative impact on air quality. Site clearing and construction activities may result in fugitive dust emissions;
- **Noise Generation** – machinery and vehicles, will be used in the establishment, operation and rehabilitation phase which will result in an increase in the ambient noise levels;
- **Siltation of wetland** – During the establishment and operational phase exposed soils may result in soil erosion and windblown dust which result in increased siltation of the wetland within the application area.
- **Loss of Fauna and Flora Habitat** – the mining extension will result in further site clearance, thus result in the further loss of fauna and flora habitat; and
- **Heritage** – Heritage resource that may be encountered during the establishment and operational phases may be disturbed or destroyed.

## 17 Proposed Impact Management Objectives and the Impact Management Outcomes for Inclusion in the EMP

Based on the assessment and where applicable the recommendations from specialist inputs, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMP as well as for inclusion as conditions of authorisation

The EMP seeks to achieve a required end state and describes how activities that have, or could have, an adverse impact on the environment will be mitigated, controlled and monitored.



This EMP addresses the environmental impacts during the Establishment, Operational, Closure and Rehabilitation Phases of the Project. Due regard must be given to environmental protection during the entire project; a number of environmental recommendations are made to achieve environmental protection. These recommendations are aimed at ensuring that the contractor maintains adequate control over the project to:

- Minimise the extent of an impact during the life of the project;
- Ensure appropriate restoration of areas affected by the project; and
- Prevent long term environmental degradation.

## 18 Aspects for inclusion as conditions of authorisation

The implementation of the mitigation measures provided in this report must be a condition of authorisation. Additional conditions include a recommendation for the implementation of a 100 m buffer zone from all watercourses and wetland areas.

It is recommended that the proposed project be granted Environmental Authorisation, with the implementation of the following key recommendations:

- Only clear vegetation and remove topsoil when and where necessary;
- Plant species such as *Boophone disticha*, must be removed as per provincial authorisation and transplanted;
- Berms must be constructed around the periphery of the mining site to separate clean and dirty water. Water within the mining site must be diverted to the water sump;
- It is recommended that a 100 m buffer zone be implemented around the wetland;
- Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided;
- Undertake an alien invasive monitoring programme; and
- Chance Finds Procedures (CFPs) and Fossil Finds Procedures must be developed and clearly describe the reporting process and appropriate management of the exposure of previously unidentified heritage resources.

## 19 Description of any Assumptions, Uncertainties and Gaps in Knowledge

Baseline environment investigations were undertaken to assess and identify the sensitivities and potential risks associated with the project. The uncertainties as a result of gaps in knowledge for the proposed expansion are as follows:

- A high-level desktop baseline environment was undertaken for this project including site visits conducted by the flora, fauna and heritage specialists.



- Many tangible heritage resources, specifically archaeological resources, commonly occur below the surface, and may not be identified, documented and assessed without intrusive and destructive methods. Intrusive archaeological assessments require permits issued as per Section 35 of the NHRA, however these are not issued as part of impact assessments. Therefore, the findings in the reviewed literature, and especially existing HIA reports, are in themselves limited to surface observations.
- The NFEPA database was utilised to identify wetlands within and in close proximity to the application area, however, no wetland delineation was undertaken. Due to the national scale at which the NFEPA project was assessed, local but not yet known wetlands may be present. It is recommended that a 100 m buffer be implemented for any local scale unknown wetlands that may be found.

## 20 Reasoned Opinion as to whether the Proposed Activity should or should not be authorised

### 20.1 Reasons why the activity should be authorised or not

The project area is surrounded by mining activities or agriculture and the current land type is degraded grassland. No red data species, river or streams are within or in close proximity to the extension area. The deposit of sand is known to be an average depth of 2.7 m while the regional groundwater table varies between 5 – 22 m below the surface, therefore, groundwater impacts are highly unlikely. One NFEPA wetland has been identified within the project area and it is recommended that a 100 m buffer be implemented to avoid impacts. The R716 road lies between the project site and other wetlands in proximity therefore impacts to this wetland is highly unlikely. The project will result in no loss of critical habitat, will not contribute to significant noise or dust pollution. Should the mitigation and management measures be correctly implemented the most impacts will be reduced to negligible significance.

### 20.2 Conditions that must be included in the authorisation

The following main conditions should be implemented to ensure the significance of the negative impacts associated with mining activities remain low:

- Vegetation clearance and remove topsoil should be restricted to the strips and associated access roads / tracks that are to be mined out;
- Plant species such as *Boophone disticha*, must be removed as per provincial authorisation and transplanted;
- Berms must be constructed around the periphery of the mining site to separate clean and dirty water. Water within the mining site must be diverted to the water sump;
- Site clearing and mining activities to take place during daylight hours only;



- Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided;
- Undertake an alien invasive monitoring programme; and
- Chance Finds and Fossil Finds Procedures must be developed and clearly describe the reporting process and appropriate management of the exposure of previously unidentified heritage resources.

## 21 Period for which the Environmental Authorisation is required

The environmental authorisation is required for a period of 2 years.

## 22 Undertaking

An undertaking is provided in Part B, Section 12 of the EMPr and is applicable to the EIA and EMPr sections of this report.

## 23 Financial Provision

An update of Copper Sunset's current environmental liabilities was conducted in May 2014 on request of the DMR, in a directive dated 24 April 2014, that a review of the financial provision be carried out detailing the rehabilitation, management and itemisation of actual costs required for premature closure, decommissioning and final closure. At that time Copper Sunset's mining operation involved the strip mining of general sand in strips of 30 m by 900 m. The mining operation on the proposed new area, for which this financial provision is calculated, will include the strip mining of general sand in strips of 35 m by a maximum of 700 m. No infrastructure will be constructed within the new mining area.

The calculation applied uses the standard method as set out by the DMR. The DMR calculation method is done in accordance with the DMR's "Guideline Document for the Evaluation of the Quantum of Closure-related Financial Provision by a Mine" published in 2005. The Master Rates as published in the DMR's Guideline Document are out-dated. All the rates used from the Master Rates updated in 2012, were updated by the average Consumer Price Index (CPI) as provided by Statistics South Africa (StatsSA) to reflect the situation as at November 2015<sup>9</sup>.

The proposed new mining area will be mined in strips of 35 m by a maximum of 700 m; however the current financial provision was calculated on mining area that is mined in strips of 30 m by 900 m, which will equate to a 200 m reduction of the mining strips for the new area. Therefore, taking into account the existing concurrent rehabilitation practices and the increase in rates to reflect Year 2015, it is assumed that the financial provision of

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<sup>9</sup> Latest CPI figures from StatsSA

R 2 150 403.54 as calculated in May 2014 is sufficient provided that concurrent rehabilitation continues for the new proposed mining area.

### 23.1 Explain how the aforesaid amount was derived

The environmental closure liability for the project was calculated according to the DMR's "Guideline Document for the Evaluation of the Quantum of Closure-related Financial Provision Provided by a Mine".

The DMR Guideline format makes use of a set template for which defined rates and multiplication factors are utilised.

The 2005 DMR Master Rates were updated and published by the DMR in 2012 however, due to inflation, these are no longer accurate. During this assessment, the 2012 Master Rates, as published by the DMR, were updated by the average Consumer Price Index (CPI) as provided by Statistics South Africa (StatsSA) to reflect the situation at November 2015<sup>10</sup>.

The DMR Guideline Document classifies a mine according to a number of factors which allows the determination of appropriate weighting factors to be used during the quantum calculation. The following factors are considered:

- The mineral mined;
- The risk class of the mine;
- Environmental sensitivity of the mining area;
- Type of mining operation; and
- Geographic location.

Table 23-1 provides a summary of the estimate calculated for each component for the proposed project.

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<sup>10</sup> Latest CPI figures from StatsSA

**Table 23-1: Environmental Liability for Copper Sunset's Operation according to the DMR Methodology**

<b>Financial Revision Calculation - Rehabilitation</b>					
	<b>Item</b>	<b>Unit</b>	<b>Quantity</b>	<b>Rate</b>	<b>Cost</b>
1	Dismantling of processing plant & related structures (incl. overland conveyors & power lines)	m <sup>3</sup>	76.10	12.82	R 976.00
2 A	Demolition of steel buildings & Structures	m <sup>2</sup>	351.00	178.60	R 62 690.00
2 B	Demolition of reinforced concrete buildings & structures	m <sup>2</sup>	125.00	263.20	R 32 900.00
5	Demolition of housing &/or administration facilities	m <sup>2</sup>	2735.50	357.21	R 977 140.00
6	Opencast rehabilitation including final voids & ramps [(30m x 900m)*3 mining strips]	ha	2.10	187250.97	R 204 478.00
8 B	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	ha	0.98	155478.46	R 152 369.00
13	Water management	ha	0.98	37600.60	R 24 689.00
14	2 to 3 years of maintenance & aftercare	ha	4.01	13160.21	R 52 763.00
<b>Sub Total 1</b>					<b>R 1 508 003.00</b>
1	Preliminary and General	12% of Sub Total 1	Weighting Factor 2	1.05	R 190 008.00
2	Administration & supervision costs	6.0% of Subtotal 1			R 90 480.00
3	Engineering drawings & specifications	2.0% of Subtotal 1			R 30 160.00
4	Engineering & procurement of specialist work	2.5% of Subtotal 1			R 37 700.00
5	Development of a closure plan	2.5% of Subtotal 1			R 37 700.00
6	Final groundwater modelling				
<b>Sub Total 1 + 2</b>					<b>R 1 894 052.20</b>
<b>VAT (14%)</b>					<b>R 265 167.31</b>
<b>GRAND TOTAL (incl. VAT)</b>					<b>R 2 159 219.50</b>

## 23.2 Confirm that this amount can be provided for from operating expenditure

Copper Sunset confirms that the amount determined in Section 23 has been provided in the form of a bank guarantee.

## 24 Specific Information required by the competent Authority

### 24.1 Impact on the socio-economic conditions of any directly affected person

- Positive impacts of the proposed Project can be summarised as follows:
  - **Employment** – Copper Sunset is reaching the end of their LoM (approximately September 2017). The mining extension is expected to extend the LoM by a further 9 months. Thus, the current Copper Sunset employees will remain employed for an extended period. Employment as well as the additional infrastructure (access road) will contribute to the overall socio-economic profile of the region.
- Negative impacts of the proposed Project can be summarised as follows:
  - **Social Nuisance** – The increased dust levels due to site clearing, use of access roads and vehicular activity as well as the increase in ambient noise levels from mining machinery and the movement of vehicles will result in social nuisance.

### 24.2 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act.

No heritage resources will be directly impacted upon by the mining activities.

## 25 Other matters required in terms of sections 24(4)(a) and (b) of the Act

Section 24(4)(b)(i) of the NEMA (as amended), provides that an investigation must be undertaken of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity. The outcome of the investigation has been provided in Section 11 to Section 12 of this Basic Assessment Report.

## Part B: Environmental Management Programme Report

## **1 Details of the EAP**

The details of the EAP have been provided in Section 2.1, Part A of this report.

## **2 Description of the aspects of the activity**

Refer to Section 5 of Part A.

## **3 Composite Map**

The composite plan for the project area, indicating sensitive areas, heritage resources, watercourse buffers is included in Plan 10, Appendix A.

## **4 Description of Impact Management Objectives including Management Statements**

### **4.1 Determination of closure objectives**

The closure objectives have been formulated for the project and are as follows:

- Rehabilitate the mining sites to its natural or predetermined state, or to land use that conforms to the generally accepted principles of sustainable development through restoration, remediation, rehabilitation and stabilisation;
- Rehabilitate all disturbed land to a condition that facilitates compliance with applicable environmental quality objectives, such as air and water quality objectives as an example;
- Reduce the visual impact of the mining site through rehabilitation of all disturbed land and residue deposits;
- Keep authorities informed of the progress of the activities during the Closure Phase;
- Submit monitoring results to the relevant authorities; and
- Maintain the required pollution control facilities and the condition of the rehabilitated land following closure.

### **4.2 Volumes and Rate of Water Use required for the Operation**

Water will be supplied via the borehole, located on the current mining operation area. This borehole is authorised under a current WUL granted to Copper Sunset. It is anticipated that water will only be required for dust suppression on the expansion area. It is unknown at this stage as to the volume of water of water required for dust suppression.

### **4.3 Has a Water Use Licence has been applied for**

A Water Use Licence was approved for Copper Sunset's current Mining Right with reference number FS 30/5/1/2/2/164 MR.

A new WULA will be compiled for this proposed expansion area.

### **4.4 Impacts to be mitigated in their Respective Phases**

The proposed mitigation measures and its compliance with the relevant standards are presented in Table 4-1.

**Table 4-1: Impacts to be mitigated**

Activities	Aspects Affected	Phase	Size and scale of disturbance	Mitigation Measures	Compliance with standards	Time period for implementation
<b>Establishment Phase</b>						
Site clearance and vegetation removal Establishment of access	Soils	Establishment Phase	19 ha	<ul style="list-style-type: none"> <li>▪ Only clear vegetation when and where necessary;</li> <li>▪ Only remove topsoil when and where necessary; and</li> <li>▪ Ensure topsoil is stockpiled, less than 3 m high.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Soil Rehabilitation Plan; and</li> <li>▪ Storm Water Management Plan in accordance with:</li> <li>▪ MPRDA Regulation 56 (1) to (8); soil pollution and erosion control; and</li> <li>▪ CARA.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ongoing and Weekly during: Establishment Phase</li> </ul>



Activities	Aspects Affected	Phase	Size and scale of disturbance	Mitigation Measures	Compliance with standards	Time period for implementation
roads Stockpiling of topsoil	Fauna and Flora	Establishment Phase	19 ha	<ul style="list-style-type: none"> <li>▪ All soils should be stored and managed correctly for rehabilitation</li> <li>▪ Only remove vegetation when and where necessary;</li> <li>▪ Minimise the size of the mined area as far as possible;</li> <li>▪ Plant SSC, such as <i>Boophone disticha</i>, must be removed as per provincial authorisation and transplanted as per regulations;</li> <li>▪ Drainage lines, and indigenous vegetation will be avoided; and</li> <li>▪ Use existing access roads.</li> </ul>	<ul style="list-style-type: none"> <li>▪ NEM:BA; and</li> <li>▪ ECA.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ongoing during: Establishment Phase</li> </ul>

Activities	Aspects Affected	Phase	Size and scale of disturbance	Mitigation Measures	Compliance with standards	Time period for implementation
	Wetlands	Establishment Phase	Local	<ul style="list-style-type: none"> <li>▪ Berms must be constructed around the periphery of the mining site to separate clean and dirty water. Water within the mining site must be diverted to the water sump; and</li> <li>▪ It is recommended that all watercourses be avoided with a stipulated buffer zone (i.e. mining outside of the 1: 50 year floodline of any watercourse and/or outside the 100 m buffer of a watercourse, whichever is greater).</li> </ul>	<ul style="list-style-type: none"> <li>▪ Buffer zones; and</li> <li>▪ Spill Response Plan in accordance with:                             <ul style="list-style-type: none"> <li>▪ NWA;</li> <li>▪ Best Practice Guidelines; and</li> <li>▪ MPRDA.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ As required and throughout the Establishment Phase</li> </ul>

Activities	Aspects Affected	Phase	Size and scale of disturbance	Mitigation Measures	Compliance with standards	Time period for implementation
	Groundwater	Establishment Phase	Local	<ul style="list-style-type: none"> <li>▪ All potential hydrocarbon spillages and leaks must be cleaned up immediately and the soils remediated;</li> <li>▪ Spillage control kits will be readily available on site to contain the mobilisation of contaminants and clean up spills;</li> <li>▪ All vehicles and machinery to be serviced in a hard park area or at an off-site location; and</li> <li>▪ Vehicles with leaks must have drip trays in place.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Spill Response Plan; and</li> <li>▪ Vehicle Maintenance Plan in accordance with:                             <ul style="list-style-type: none"> <li>▪ NWA;</li> <li>▪ Best Practice Guidelines</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ As required</li> </ul>

Activities	Aspects Affected	Phase	Size and scale of disturbance	Mitigation Measures	Compliance with standards	Time period for implementation
	Noise	Establishment Phase	Site Specific	<ul style="list-style-type: none"> <li>▪ Site clearing to take place during daylight hours only;</li> <li>▪ Vehicles and machinery will be properly maintained on a regular basis to minimise operating noise;</li> <li>▪ Switching off equipment when not in use.</li> <li>▪ Vehicles will obey speed limits (30km/h); and</li> <li>▪ Bulk Delivery of materials should be maximised to reduce the frequency of deliveries.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Vehicle Inspections in accordance with:</li> <li>▪ ECA.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Daily and according to Maintenance Plan during the Establishment and Closure Phases</li> </ul>

Activities	Aspects Affected	Phase	Size and scale of disturbance	Mitigation Measures	Compliance with standards	Time period for implementation
	Air Quality	Establishment Phase	Local	<ul style="list-style-type: none"> <li>▪ Only remove topsoil when and where necessary; and</li> <li>▪ Ensure topsoil is stockpiled, less than 3 m high.;</li> <li>▪ Stockpiles or loaded material should be covered during windy/rainfall days and where practical;</li> <li>▪ Use of dust suppression measures such as watering must be implemented on the access roads and topsoil stockpiles; and</li> <li>▪ Drop heights must be minimised during sand loading.</li> </ul>	<ul style="list-style-type: none"> <li>▪ NEM:AQA</li> </ul>	<ul style="list-style-type: none"> <li>▪ As required and throughout the Establishment Phase</li> </ul>
<b>Operational Phase</b>						

Activities	Aspects Affected	Phase	Size and scale of disturbance	Mitigation Measures	Compliance with standards	Time period for implementation
Mining of sand resources Transportation of sand	Continued Employment	Operational Phase	Local	<ul style="list-style-type: none"> <li>▪ Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided; and</li> <li>▪ Promote labour -intensive construction methods.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Social and Labour Plan</li> </ul>	<ul style="list-style-type: none"> <li>▪ During employment contract</li> </ul>

Activities	Aspects Affected	Phase	Size and scale of disturbance	Mitigation Measures	Compliance with standards	Time period for implementation
	Soils	Operational Phase	Site Specific	<ul style="list-style-type: none"> <li>▪ Immediately cease mining and contain and clean-up any hydrocarbon spillages as they occur;</li> <li>▪ Stockpiles must be suppressed with water during windy conditions.</li> <li>▪ Ensure the spill clean-up kits are readily available in the event of a spillage; and</li> <li>▪ Machinery and vehicles must be serviced and maintained off site at a workshop and drip trays must be in place to capture the spillage and avoid soils from being contaminated.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Spill Response Plan in accordance with:                             <ul style="list-style-type: none"> <li>▪ MPRDA Regulation 56 (1) to (8); soil pollution and erosion control; and</li> <li>▪ CARA.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ As required and throughout the Operational Phase</li> </ul>



Activities	Aspects Affected	Phase	Size and scale of disturbance	Mitigation Measures	Compliance with standards	Time period for implementation
	Surface water/Wetlands	Operational Phase	Local	<ul style="list-style-type: none"> <li>▪ Only clear vegetation when and where necessary;</li> <li>▪ Berms on the periphery of the mining site will be inspected daily and maintained to ensure runoff from within the mining site does not report to the catchment.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Spill Response Plan in accordance with:</li> <li>▪ MPRDA Regulation 56 (1) to (8); soil pollution and erosion control.</li> </ul>	<ul style="list-style-type: none"> <li>▪ As required and throughout the Operational Phase</li> </ul>
	Groundwater	Operational Phase	Local	<ul style="list-style-type: none"> <li>▪ Emergency spill response plan required to handle any unplanned spillages; and</li> <li>▪ Daily inspection of the drill rig must be undertaken prior to the commencement of drilling and routine maintenance must be undertaken to prevent the likelihood of fluid dispersing and breakdowns;</li> <li>▪</li> </ul>	<ul style="list-style-type: none"> <li>▪ Spill Response Plan; and</li> <li>▪ Vehicle Maintenance Plan in accordance with:                             <ul style="list-style-type: none"> <li>▪ NWA; and</li> <li>▪ Best Practice Guidelines</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ As required.</li> </ul>



Activities	Aspects Affected	Phase	Size and scale of disturbance	Mitigation Measures	Compliance with standards	Time period for implementation
	Noise	Operational Phase	Site Specific	<ul style="list-style-type: none"> <li>▪ Mining related machines and vehicles to be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and</li> <li>▪ Switching off equipment when not in use.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular Vehicle Inspections in accordance with :                             <ul style="list-style-type: none"> <li>▪ ECA.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Daily and according to Maintenance Plan during: Operational Phase</li> </ul>
	Air Quality	Operational Phase	Local	<ul style="list-style-type: none"> <li>▪ Use of dust suppression measures must be implemented on the access roads;</li> <li>▪ Use of tarpaulins on all trucks transporting the sand material; and</li> <li>▪ Drop heights must be minimised during loading of sand.</li> </ul>	<ul style="list-style-type: none"> <li>▪ NEM:AQA</li> </ul>	<ul style="list-style-type: none"> <li>▪ Daily and according to Maintenance Plan during: Operational Phase</li> </ul>
<b>Closure and Rehabilitation Phase</b>						

Activities	Aspects Affected	Phase	Size and scale of disturbance	Mitigation Measures	Compliance with standards	Time period for implementation
Rehabilitation (topsoil cover, ripping and vegetation establishment)	Fauna and Flora	Closure and Rehabilitation Phase	19 ha	<ul style="list-style-type: none"> <li>Remove alien invasive species as and when they occur;</li> <li>An alien invasive management plan must be established; and</li> <li>All compacted areas will be ripped to loosen the soils during rehabilitation and seeded with an appropriate seed mixture.</li> </ul>	<ul style="list-style-type: none"> <li>NEM:BA</li> </ul>	<ul style="list-style-type: none"> <li>Ongoing during closure phase.</li> </ul>
	Noise	Closure and Rehabilitation Phase	Site Specific	<ul style="list-style-type: none"> <li>Mining related machines and vehicles to be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and</li> <li>Switching off equipment when not in use.</li> </ul>	<ul style="list-style-type: none"> <li>Regular Vehicle Inspections in accordance with :                             <ul style="list-style-type: none"> <li>ECA.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Ongoing during closure phase</li> </ul>

## 5 Impact Management Outcomes

A description of objectives and outcomes of the Environment Management Plan is outlined in Table 5-1, taking into account the impact and mitigation type.

**Table 5-1: Summary of Impact Management Outcomes**

Project Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standards to be achieved
<b>Establishment Phase</b>					
Site clearance and vegetation removal Establishment of access roads Stockpiling of topsoil	Dust generation	Air Quality	Establishment Phase	Control through: <ul style="list-style-type: none"> <li>▪ Dust Management Plan.</li> <li>▪ Vegetation Establishment.</li> </ul>	<ul style="list-style-type: none"> <li>▪ NEM:AQA</li> </ul>
	Soil compaction and soil erosion	Soils	Establishment Phase	Control through: <ul style="list-style-type: none"> <li>▪ Soil stripping procedure.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Soil Rehabilitation Plan; and</li> <li>▪ Storm Water Management Plan in accordance with:</li> <li>▪ MPRDA Regulation 56 (1) to (8); soil pollution and erosion control; and CARA.</li> </ul>
	Loss of fauna and flora species	Fauna and Flora	Establishment Phase	Avoid through: <ul style="list-style-type: none"> <li>▪ Limitation of infrastructure footprint.</li> </ul>	<ul style="list-style-type: none"> <li>▪ NEM:BA; and</li> <li>▪ ECA.</li> </ul>
	Sedimentation of wetlands	Surface water/ Wetlands	Establishment Phase	Prevent through: <ul style="list-style-type: none"> <li>▪ Storm Water Management Plan.</li> </ul> Avoid through: <ul style="list-style-type: none"> <li>▪ Implementation of buffer zones.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Buffer zones; and</li> <li>▪ Spill Response Plan in accordance with:</li> <li>▪ NWA;</li> <li>▪ Best Practice Guidelines; and</li> <li>▪ MPRDA.</li> </ul>

Project Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standards to be achieved
	Noise generation	Noise	Establishment Phase	Control through: <ul style="list-style-type: none"> <li>▪ Operating hours;</li> <li>▪ Use of silencers; and</li> <li>▪ Routine maintenance and services.</li> </ul>	<ul style="list-style-type: none"> <li>▪ ECA.</li> </ul>
<b>Operational Phase</b>					
Mining of sand resources Transportation of sand	Soil erosion	Soils	Operational Phase	Avoid and control through: <ul style="list-style-type: none"> <li>▪ Vegetation establishment.</li> <li>▪ Restrict access.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Soil Rehabilitation Plan; and</li> <li>▪ Storm Water Management Plan in accordance with:</li> <li>▪ MPRDA Regulation 56 (1) to (8); soil pollution and erosion control; and CARA</li> </ul>
	Sedimentation of surface water resources	Surface Water/Wetlands	Operational Phase	Avoid through: <ul style="list-style-type: none"> <li>▪ Implementation of buffer zones; and</li> <li>▪ Erosion management through stormwater control.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Buffer zones; and</li> <li>▪ Spill Response Plan in accordance with:</li> <li>▪ NWA; and</li> <li>▪ Best Practice Guidelines;</li> </ul>

Project Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standards to be achieved
	Noise Generation	Noise	Operational Phase	Control through: <ul style="list-style-type: none"> <li>▪ Operating hours;</li> <li>▪ Use of silencers; and</li> <li>▪ Routine maintenance and services.</li> </ul>	<ul style="list-style-type: none"> <li>▪ ECA.</li> </ul>
	Dust Generation	Air Quality	Operational Phase	Control through: <ul style="list-style-type: none"> <li>▪ Dust Management Plan;</li> <li>▪ Only remove necessary vegetation</li> </ul>	<ul style="list-style-type: none"> <li>▪ NEM:AQA</li> </ul>
	Continued Employment	Social	Operational Phase	Manage through supporting workers	<ul style="list-style-type: none"> <li>▪ SLP</li> </ul>
<b>Rehabilitation Phase</b>					
Rehabilitation (topsoil cover, ripping and vegetation establishment)	Establishment of Alien Invasive Species	Flora	Rehabilitation Phase	Control through: <ul style="list-style-type: none"> <li>▪ Dust Management Plan.</li> <li>▪ Vegetation establishment.</li> </ul>	<ul style="list-style-type: none"> <li>▪ NEM:BA</li> </ul>

Project Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standards to be achieved
	Noise Generation	Noise	Rehabilitation Phase	Control through: <ul style="list-style-type: none"> <li>▪ Operating hours;</li> <li>▪ Use of silencers; and</li> <li>▪ Routine maintenance and services.</li> </ul>	<ul style="list-style-type: none"> <li>▪ ECA.</li> </ul>

## 6 Impact Management Actions

Table 6-1 provides a summary and description of the impact management actions.

**Table 6-1: Summary of Impact Management Actions**

Project Activity	Potential Impact	Mitigation Type	Time period for implementation	Standards to be achieved
<b>Establishment Phase</b>				
Site clearance and vegetation removal	Dust generation	Control through: <ul style="list-style-type: none"> <li>▪ Dust Management Plan.</li> <li>▪ Vegetation Establishment.</li> </ul>	<ul style="list-style-type: none"> <li>▪ As required and throughout the Establishment Phase</li> </ul>	<ul style="list-style-type: none"> <li>▪ NEM:AQA</li> </ul>
Establishment of access roads Stockpiling of topsoil	Soil compaction and soil erosion	Control through: <ul style="list-style-type: none"> <li>▪ Soil stripping procedure.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ongoing and Weekly during: Establishment Phase</li> </ul>	<ul style="list-style-type: none"> <li>▪ Soil Rehabilitation Plan; and</li> <li>▪ Storm Water Management Plan in accordance with:</li> <li>▪ MPRDA Regulation 56 (1) to (8); soil pollution and erosion control; and CARA.</li> </ul>
	Loss of fauna and flora species	Avoid through: <ul style="list-style-type: none"> <li>▪ Limitation of infrastructure footprint.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ongoing during: Establishment Phase</li> </ul>	<ul style="list-style-type: none"> <li>▪ NEM:BA</li> </ul>

Project Activity	Potential Impact	Mitigation Type	Time period for implementation	Standards to be achieved
	Sedimentation of wetlands	Prevent through: <ul style="list-style-type: none"> <li>Storm Water Management Plan.</li> <li>Avoid through:                             <ul style="list-style-type: none"> <li>Implementation of buffer zones.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>As required and throughout the Establishment Phase</li> </ul>	<ul style="list-style-type: none"> <li>Buffer zones;</li> <li>Spill Response Plan in accordance with:                             <ul style="list-style-type: none"> <li>NWA;</li> <li>Best Practice Guidelines; and</li> <li>MPRDA.</li> </ul> </li> </ul>
	Noise generation	Control through: <ul style="list-style-type: none"> <li>Operating hours;</li> <li>Use of silencers; and</li> <li>Routine maintenance and services.</li> </ul>	<ul style="list-style-type: none"> <li>Daily and according to Maintenance Plan during the Establishment Closure Phases</li> </ul>	<ul style="list-style-type: none"> <li>ECA.</li> </ul>
	Continued Employment	Manage through supporting workers	<ul style="list-style-type: none"> <li>Duration of employment contract</li> </ul>	<ul style="list-style-type: none"> <li>SLP</li> </ul>
<b>Operational Phase</b>				
Mining of sand resources Transportation of sand	Soil erosion	Avoid and control through: <ul style="list-style-type: none"> <li>Vegetation establishment.</li> <li>Restrict access.</li> </ul>	<ul style="list-style-type: none"> <li>As required and throughout the Operational Phase</li> </ul>	<ul style="list-style-type: none"> <li>Soil Rehabilitation Plan; and</li> <li>Storm Water Management Plan in accordance with:                             <ul style="list-style-type: none"> <li>MPRDA Regulation 56 (1) to (8); soil pollution and erosion control; and CARA</li> </ul> </li> </ul>



Project Activity	Potential Impact	Mitigation Type	Time period for implementation	Standards to be achieved
	Sedimentation of surface water resources	Avoid through: <ul style="list-style-type: none"> <li>Implementation of buffer zones; and</li> <li>Erosion management through stormwater control.</li> </ul>	<ul style="list-style-type: none"> <li>As required and throughout the Operational Phase</li> </ul>	<ul style="list-style-type: none"> <li>Buffer zones; and</li> <li>Spill Response Plan in accordance with:</li> <li>NWA; and</li> <li>Best Practice Guidelines;</li> </ul>
	Noise Generation	Control through: <ul style="list-style-type: none"> <li>Operating hours;</li> <li>Use of silencers; and</li> <li>Routine maintenance and services.</li> </ul>	<ul style="list-style-type: none"> <li>Daily and according to Maintenance Plan during the Establishment and Closure Phases</li> </ul>	<ul style="list-style-type: none"> <li>ECA.</li> </ul>
	Dust Generation	Control through: <ul style="list-style-type: none"> <li>Dust Management Plan;</li> <li>Only remove necessary vegetation</li> </ul>	<ul style="list-style-type: none"> <li>As required and throughout the Establishment Phase</li> </ul>	<ul style="list-style-type: none"> <li>NEM:AQA</li> </ul>

Project Activity	Potential Impact	Mitigation Type	Time period for implementation	Standards to be achieved
	Continued Employment	Manage through supporting workers	<ul style="list-style-type: none"> <li>During employment contract</li> </ul>	<ul style="list-style-type: none"> <li>SLP</li> </ul>
<b>Rehabilitation Phase</b>				
Rehabilitation (topsoil cover, ripping and vegetation establishment)	Establishment of Alien Invasive Species	Control through: <ul style="list-style-type: none"> <li>Dust Management Plan.</li> <li>Vegetation establishment.</li> </ul>	<ul style="list-style-type: none"> <li>Ongoing during closure phase.</li> </ul>	<ul style="list-style-type: none"> <li>NEM:BA</li> </ul>
	Noise Generation	Control through: <ul style="list-style-type: none"> <li>Operating hours;</li> <li>Use of silencers; and</li> <li>Routine maintenance and services.</li> </ul>	<ul style="list-style-type: none"> <li>Ongoing during closure phase</li> </ul>	<ul style="list-style-type: none"> <li>ECA.</li> </ul>

## 7 Financial Provision

### 7.1 Determination of the amount of Financial Provision

#### 7.1.1 Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulations

The closure objectives have been formulated for the project, taking into account the baseline environment of the project site. The closure objectives for the project are as follows:

- Rehabilitate the mining sites to its natural or predetermined state, or to land use that conforms to the generally accepted principles of sustainable development through restoration, remediation, rehabilitation and stabilisation;
- Rehabilitate all disturbed land to a condition that facilitates compliance with applicable environmental quality objectives, such as air and water quality objectives;
- Reduce the visual impact of the mining site through rehabilitation of all disturbed land and residue deposits;
- Develop a retrenchment programme in a timely manner;
- Keep authorities informed of the progress of the activities during the Closure Phase;
- Submit monitoring results to the relevant authorities; and
- Maintain the required pollution control facilities and the condition of the rehabilitated land following closure.

#### 7.1.2 Confirm specifically that the Environmental Objectives in relation to Closure have been consulted with landowner and Interested and Affected Parties

As part of the PPP, this Basic Assessment Report, along with the closure objectives, was provided for comment and review to I&APs and stakeholders.

#### 7.1.3 Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure

The mining site will be rehabilitated concurrently meaning that as a new strip is mined the previous mined section will be rehabilitated. The rehabilitation process is summarised as follows:

- The open mine strip will be backfilled with topsoil;
- The site will be re-shaped, levelled and ripped to ensure there is no compaction;

- The topsoil will be spread over the site and the site vegetated with indigenous vegetation; and
- The site will be monitored for the success of the rehabilitation.

#### **7.1.4 Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives**

The rehabilitation plan has been compiled in support of the primary closure objective which is to rehabilitate the mining area to its natural or predetermined state, or to land use that conforms to the generally accepted principles of sustainable development through restoration, remediation, rehabilitation and stabilisation remediation of the impact land to a post-mining land use capable of supporting grazing activities.

#### **7.1.5 Calculate and State the Quantum of the Financial Provision required to manage and Rehabilitate the Environment in accordance with the Applicable Guideline**

The environmental closure liability for the project was calculated according to the DMR's "Guideline Document for the Evaluation of the Quantum of Closure-related Financial Provision Provided by a Mine".

The DMR Guideline format makes use of a set template for which defined rates and multiplication factors are utilised.

The 2005 DMR Master Rates were updated and published by the DMR in 2012 however, due to inflation, these are no longer accurate. During this assessment, the 2012 Master Rates, as published by the DMR, were updated by the average Consumer Price Index (CPI) as provided by Statistics South Africa (StatsSA) to reflect the situation at November 2015<sup>11</sup>.

The DMR Guideline Document classifies a mine according to a number of factors which allows the determination of appropriate weighting factors to be used during the quantum calculation. The following factors are considered:

- The mineral mined;
- The risk class of the mine;
- Environmental sensitivity of the mining area;
- Type of mining operation; and
- Geographic location.

Table 7-1 provides a summary of the estimate calculated for each component for the proposed project.

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<sup>11</sup> Latest CPI figures from StatsSA

**Table 7-1: Environmental Liability for Copper Sunset’s Operations according to the DMR Methodology**

<b>Financial Revision Calculation - Rehabilitation</b>					
	<b>Item</b>	<b>Unit</b>	<b>Quantity</b>	<b>Rate</b>	<b>Cost</b>
1	Dismantling of processing plant & related structures (incl. overland conveyors & power lines)	m <sup>3</sup>	76.10	12.82	R 976.00
2 A	Demolition of steel buildings & Structures	m <sup>2</sup>	351.00	178.60	R 62 690.00
2 B	Demolition of reinforced concrete buildings & structures	m <sup>2</sup>	125.00	263.20	R 32 900.00
5	Demolition of housing &/or administration facilities	m <sup>2</sup>	2735.50	357.21	R 977 140.00
6	Opencast rehabilitation including final voids & ramps [(30m x 900m)*3 mining strips]	ha	2.10	187250.97	R 204 478.00
8 B	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	ha	0.98	155478.46	R 152 369.00
13	Water management	ha	0.98	37600.60	R 24 689.00
14	2 to 3 years of maintenance & aftercare	ha	4.01	13160.21	R 52 763.00
<b>Sub Total 1</b>					<b>R 1 508 003.00</b>
1	Preliminary and General	12% of Sub Total 1	Weighting Factor 2	1.05	R 190 008.00
2	Administration & supervision costs	6.0% of Subtotal 1			R 90 480.00
3	Engineering drawings & specifications	2.0% of Subtotal 1			R 30 160.00
4	Engineering & procurement of specialist work	2.5% of Subtotal 1			R 37 700.00
5	Development of a closure plan	2.5% of Subtotal 1			R 37 700.00
6	Final groundwater modelling				
<b>Sub Total 1 + 2</b>					<b>R 1 894 052.20</b>
<b>VAT (14%)</b>					<b>R 265 167.31</b>
<b>GRAND TOTAL (incl. VAT)</b>					<b>R 2 159 219.50</b>



### 7.1.6 Confirm that the financial provision will be provided as determined

The applicant, Copper Sunset, has already provided the financial provision as determined in Section 7, Part B. Due to the decrease in length of the mining strips, as well as the continued concurrent rehabilitation to be undertaken, it is deemed that this figure is considered adequate for the expansion of the Mining Right area.

## 8 Monitoring compliance with and performance assessment

Copper Sunset will be responsible for the implementation of all of the monitoring of mitigation and management measures, as well as compliance with the EMP. The recommended monitoring for the identified impacts is detailed in Table 8-1. Copper Sunset will keep a record of all environmental monitoring carried out on site.

### 8.1 Monitoring of Impact Management Actions

The identified impacts that require monitoring programmes include the following:

- Site clearing and establishment:
  - Removal of vegetation; and
  - Soil erosion.
- Mining:
  - Soil erosion;
  - Dust and noise;
  - Water generated; and
  - Groundwater levels and quality.
- Heritage landscape;
- Hydrocarbon spillages;
- Domestic waste;
- Fires; and
- Rehabilitation.

Supervisors must be appointed to monitor the potential impacts of the above mentioned activities and Project Managers will foresee that all of the management plans are implemented. Once the mining activities have been completed, Copper Sunset will appoint an independent environmental officer to conduct a site visit to audit the rehabilitation and a report will be compiled and submitted to the DMR.

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## **8.2 Monitoring and Reporting Frequency**

Table 8-1 discussed the monitoring and reporting frequency for the management of impacts.

## **8.3 Responsible Persons**

The roles and responsibilities with respect to the monitoring programme are discussed in Table 8-1.

## **8.4 Time Period for Implementing Impact Management Actions**

Table 8-1 captures the time period for implementing the impact management actions.

## **8.5 Mechanism for Monitoring Compliance**

The method for monitoring the implementation of the impact management actions, the frequency of monitoring the implementation of the impact management actions, an indication of the persons who will be responsible for implementation of the impact management actions, the time periods within which the impact management actions must be implemented and the mechanism for monitoring compliance with the identified impact management actions are summarised in Table 8-1.

**Table 8-1: Monitoring and Management of Environmental Impacts**

Source Activity	Impacts requiring monitoring programmes	Functional requirements for monitoring	Roles and responsibilities (For the execution of the monitoring programmes)	Monitoring and reporting frequency and time periods for implementing impact management actions
All project activities	Removal of vegetation	<ul style="list-style-type: none"> <li>Vegetation cleared from the mining site will be stored for rehabilitation or removed from the area should it not be adequate to use for rehabilitation. Only the necessary vegetation required for the mining activities will be cleared and indigenous trees will be avoided.</li> </ul>	<ul style="list-style-type: none"> <li>Environmental Manager</li> </ul>	Daily
	Soil erosion	<ul style="list-style-type: none"> <li>All topsoil removed will be stored in a stockpile and protected from erosion for use during rehabilitation. Daily site inspection will be undertaken by the site manager to ensure that all soil erosion mitigation measures are in place and implemented.</li> </ul>	<ul style="list-style-type: none"> <li>Environmental Manager</li> <li>Soil Specialist</li> </ul>	Daily
	Dust and Noise	<ul style="list-style-type: none"> <li>Dust suppression must be implemented and a dust monitoring network must be established; and</li> <li>Heavy machinery and vehicles must be maintained and serviced regularly and, if possible, a silencing system should be fitted. Mining must only take place during daylight hours, which are to be communicated to directly affected persons.</li> </ul>	<ul style="list-style-type: none"> <li>Environmental Manager</li> </ul>	Daily
	Access roads	<ul style="list-style-type: none"> <li>Traffic control measures must be implemented to prevent the occurrence of road accidents; and</li> </ul>	<ul style="list-style-type: none"> <li>Environmental Manager</li> </ul>	Daily



		<ul style="list-style-type: none"> <li>Machinery operators and drivers must be made aware of the possible safety hazards that they could pose</li> </ul>		
	Heritage landscape	<ul style="list-style-type: none"> <li>A Watching Brief must be implemented during site establishment in the event that heritage resources are discovered. Identified heritage resources (historical structures, graves and Iron Age sites) must be avoided and a 50 m buffer implemented</li> </ul>	<ul style="list-style-type: none"> <li>Environmental Manager</li> </ul>	Daily during site establishment
	Use of hydrocarbons	<ul style="list-style-type: none"> <li>Spill tray will be placed under the machinery to collect any hydrocarbon leaks and spillages. Should spillages occur, the soil must be cleared and treated utilising bioremediation techniques. Should the soil not be adequately treated on site, the soil must be removed from the prospecting drill site and disposed of at a waste handling facility</li> </ul>	<ul style="list-style-type: none"> <li>Environmental Manager</li> </ul>	Daily
	Rehabilitation	<ul style="list-style-type: none"> <li>Review of rehabilitation after each mining strip has been rehabilitated</li> </ul>	<ul style="list-style-type: none"> <li>Environmental Manager</li> </ul>	After the completion of each prospecting activity



## **9 Indicate the frequency of the submission of the performance assessment/ environmental audit report**

A performance assessment report for the project will be submitted on an annual basis to the DMR during Establishment and during Operational Phase.

## **10 Environmental Awareness Plan**

### **10.1 Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work**

Copper Sunset has developed Environmental, Health and Safety Policies. The Environmental Policy will be communicated to all personnel, whether they are contractors or permanent staff, and the policy will be erected at each active mining site.

Employees will receive general environmental awareness training on specific items contained in this EMP, as well as on Best Possible Environmental Practices (BPEP).

#### **10.1.1 Specific Environmental Training**

Environmental Awareness Training will be undertaken to make employees and contractors aware of the following:

- The importance of conforming with the environmental policy and procedures and with the requirements of the EMP;
- The significant social and environmental impacts of their work activities and the environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirements of the environmental management system;
- The potential consequences of departure from specified operating procedures; and
- Possible archaeological finds action steps for mitigation measures, surface collections, excavations and communication routes to follow in the case of a discovery.

The guidelines for training are summarised below, which are in line with the ISO 14001:2004 guidelines with regards to training and awareness creation.

**Table 10-1: Training Guidelines**

<b>Types of Training</b>	<b>Audience</b>	<b>Purpose</b>
Raising awareness of the strategic importance of environmental management	Senior management	To gain commitment and alignment to the organisation's environmental policy.
Raising general environmental awareness	All employees	To gain commitment to the environmental policy and objectives and to instil a sense of individual responsibility.
Skill enhancement	Employees with environmental responsibilities	To improve performance in specific tasks.
Compliance	Employees whose actions can affect compliance	To ensure that regulatory and internal requirements for training are met.

The training programme will consist of the following elements:

- Identification of employee training needs;
- Development of a training plan to address defined needs;
- Verification of conformance of the training programme to regulatory or organisation requirements and standards;
- Training of target employee groups;
- Documentation of training received; and
- Evaluation of training received.

This training is undertaken on an annual basis for all personnel, together with the annual required induction programmes. The training material provided will be subject to annual review, based on issues such as incidents, accidents, new legislative requirements, modified processes and environmental and social aspects identified from time to time. This training is to be carried out and coordinated internally by Copper Sunset.

Copper Sunset will, therefore, develop the capabilities and support mechanisms necessary to achieve its environmental policy, objectives and targets.

In addition, an Emergency Preparedness Plan will be communicated and trained to all site personnel during the induction process.

## **10.2 Manner in which risks will be dealt with to avoid pollution or the degradation of the environment**

An Emergency Response Plan has been developed and is the approach used by Copper Sunset to respond to risks that may pollute or degrade the environment during the operational phase.


## 11 Specific information required by the Competent Authority

The financial provision for the environmental rehabilitation and closure requirements of mining operations is governed by National Environmental Management Act, 1998, Act 107 of 1998), as amended, (NEMA) which provides in Section 24P that the holder of a mining right must make financial provision for rehabilitation of negative environmental impacts. The financial provision will be reviewed annually.

## 12 Undertaking

The EAP, Duncan Pettit, herewith confirms:-

- the correctness of the information provided in the reports
- the inclusion of comments and inputs from stakeholders and I&APs ;
- the inclusion of inputs and recommendations from the specialist reports where relevant; and
- the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

<b>Signature of the Environmental Assessment Practitioner:</b>	
<b>Name of Company:</b>	Digby Wells Environmental
<b>Date:</b>	June 2016



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Basic Assessment Report and Environmental Management Programme

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## Appendix A: Project Locality Plans

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## Appendix B: Details of the EAP



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## Appendix C: PPP Documents

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## Appendix D: Heritage Report